Classification and Management of Short and Long Term Complications in Esophageal Cancer Surgery

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Your patient is leaking following esophagectomy!!!

First Step

Incidence of GI leaks

Type of anastomosis	Incidence of anastomotic leak
Esophageal	9.6%–14%
Stomach	1.1%–3.3%
Small intestine	1%–3.8%
Ileocolic	2%–6.5%
Colocolonic	3%–5.4%
Colorectal	7%–13%
Ileorectal	5%–19%

Phillips BR, Open access surgery, 2016

Population based analyses of esophagogastric anastomotic leak rates based on location

Author, Year	#	Study Design	Leak Rate
Hulscher et al, 2001	5662	Systematic review and meta-analysis	Cervical = 13.6% Intrathoracic = 7.2%
Markar et al, 2013	298	Systematic review and meta-analysis	Cervical = 13.6% Intrathoracic = 3%
Kassis et al, 2013	7595	Retrospective database review	Cervical = 12.3% Intrathoracic = 9.3%

Jones, C, Thorac Surg Clin 25 (2015)

Mortality and length of stay in patients with and without anastomotic leak

Characteristic	No Leak (n = 6,791) n (%)	Leak (n = 804) n (%)	Total (n = 7,595) n (%)	*p* Value
Length of stay (days)	n = 6,711	n = 794	n = 7,505	<0.001
Mean ± SD	13.1 ± 12.3	27.4 ± 23.8	14.7 ± 14.6	
Median	10.0	19.5	10.0	
Range	0.0–342.0	3.0–187.0	0.0–342.0	
IQR	8.0–14.0	12.0–33.0	8.0–15.0	
Discharge or 30-day mortality	n = 6,755	n = 800	n = 7,555	<0.001
1 = Alive	6,543 (96.9)	742 (92.8)	7,585 (96.4)	
2 = Dead	212 (3.1)	58 (7.2)	270 (3.6)	

IQR = interquartile range; SD = standard deviation.

Mortality is more than doubled with a leak

Kassis, E, Ann Thorac Surg 96 (2013)

Critical issues in managing an esophogastric anastomotic leak

Timing—early or not

Stability of patient

Comorbidities

Size of defect

Location of defect

Extent of contamination

Conduit necrosis present or not

Consensus definition of anastomotic leak

Anastomotic Leak

Defined as: Full thickness GI defect involving esophagus, anastomosis, staple line, or conduit irrespective of presentation or method of identification

Type I: Local defect requiring no change in therapy or treated medically or with dietary modification

Type II: Localized defect requiring interventional but not surgical therapy, for example, interventional radiology drain, stent or bedside opening, and packing of incision

Type III: Localized defect requiring surgical therapy

Low, D, Ann Surg 262 (2015)

Consensus definition of conduit necrosis

Conduit Necrosis

Type I: Conduit necrosis focal

Identified endoscopically
Treatment—Additional monitoring or non-surgical therapy

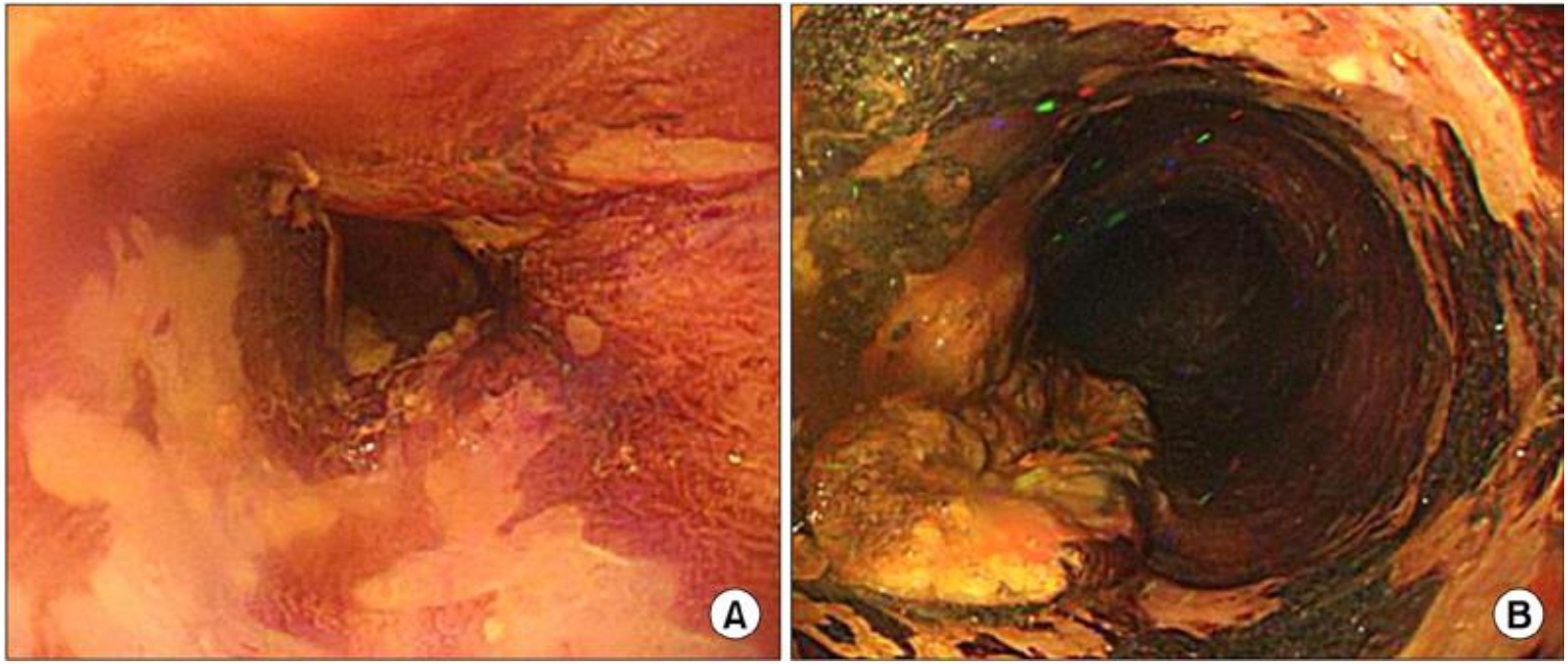
Type II: Conduit necrosis focal

Identified endoscopically and not associated with free anastomotic or conduit leak
Treatment—Surgical therapy not involving esophageal diversion

Type III: Conduit necrosis extensive

Treatment—Treated with conduit resection with diversion

Gastric necrosis

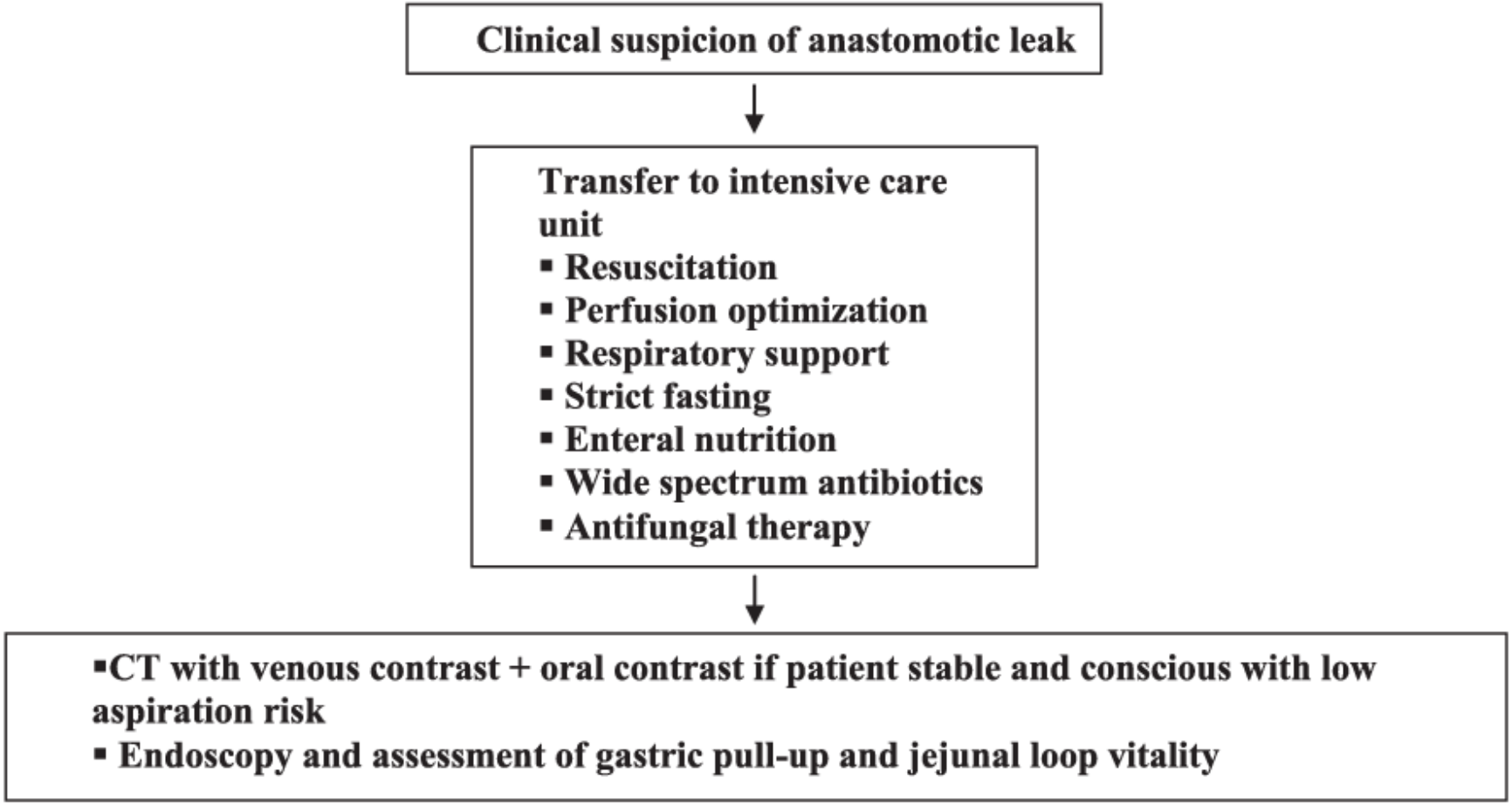


Methods to diagnose esophageal leak

- Clinical signs and symptoms
- Character of drain output
- Contrast esophagogram
- Flexible upper endoscopy
- Computed tomography scan (with or without oral contrast)
- Analysis of amylase level in drain fluid

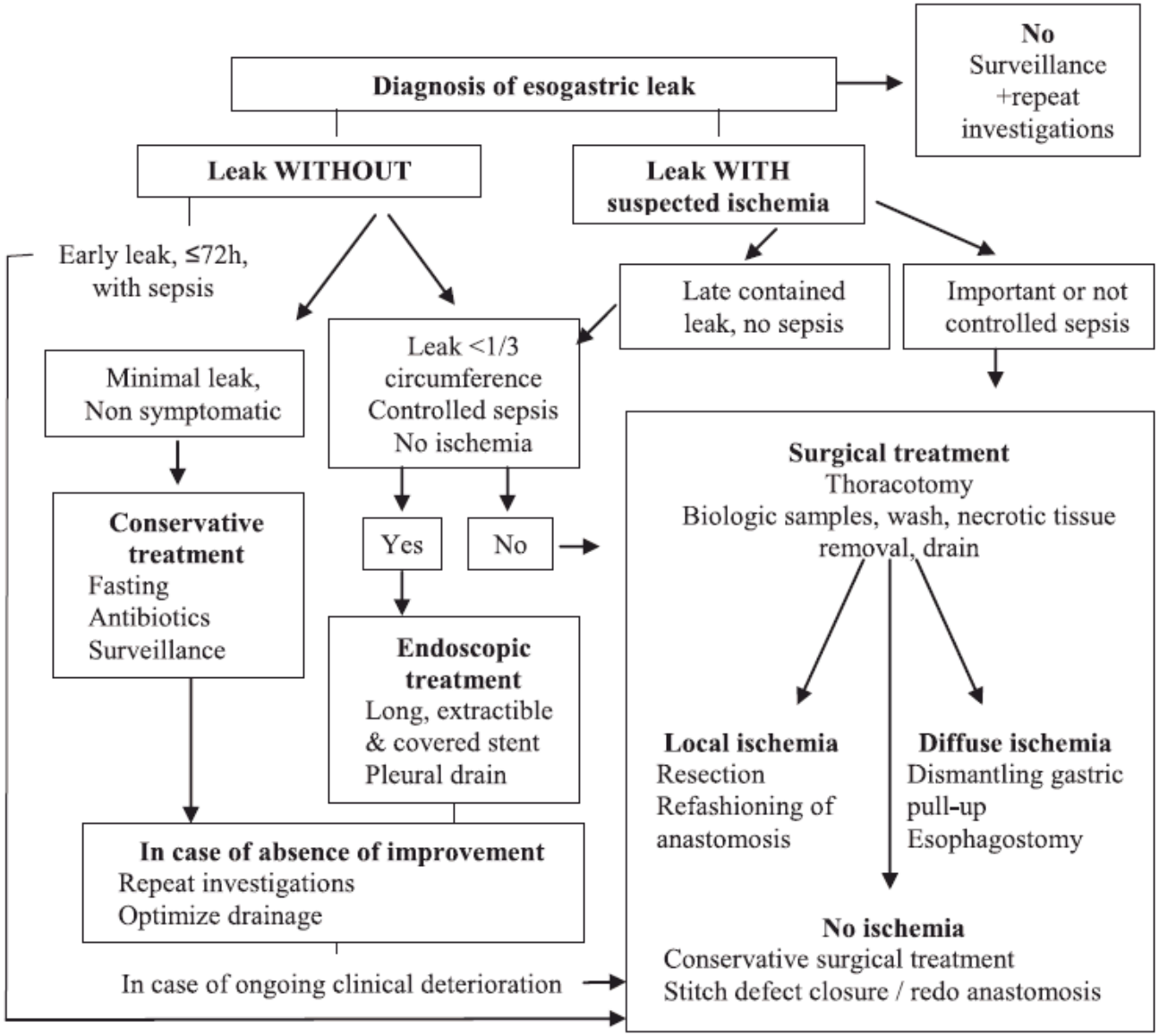
Jones, C, Thorac Surg Clin 25 (2015)

Principles of diagnosis and resuscitation of an esophageal anastomotic leak



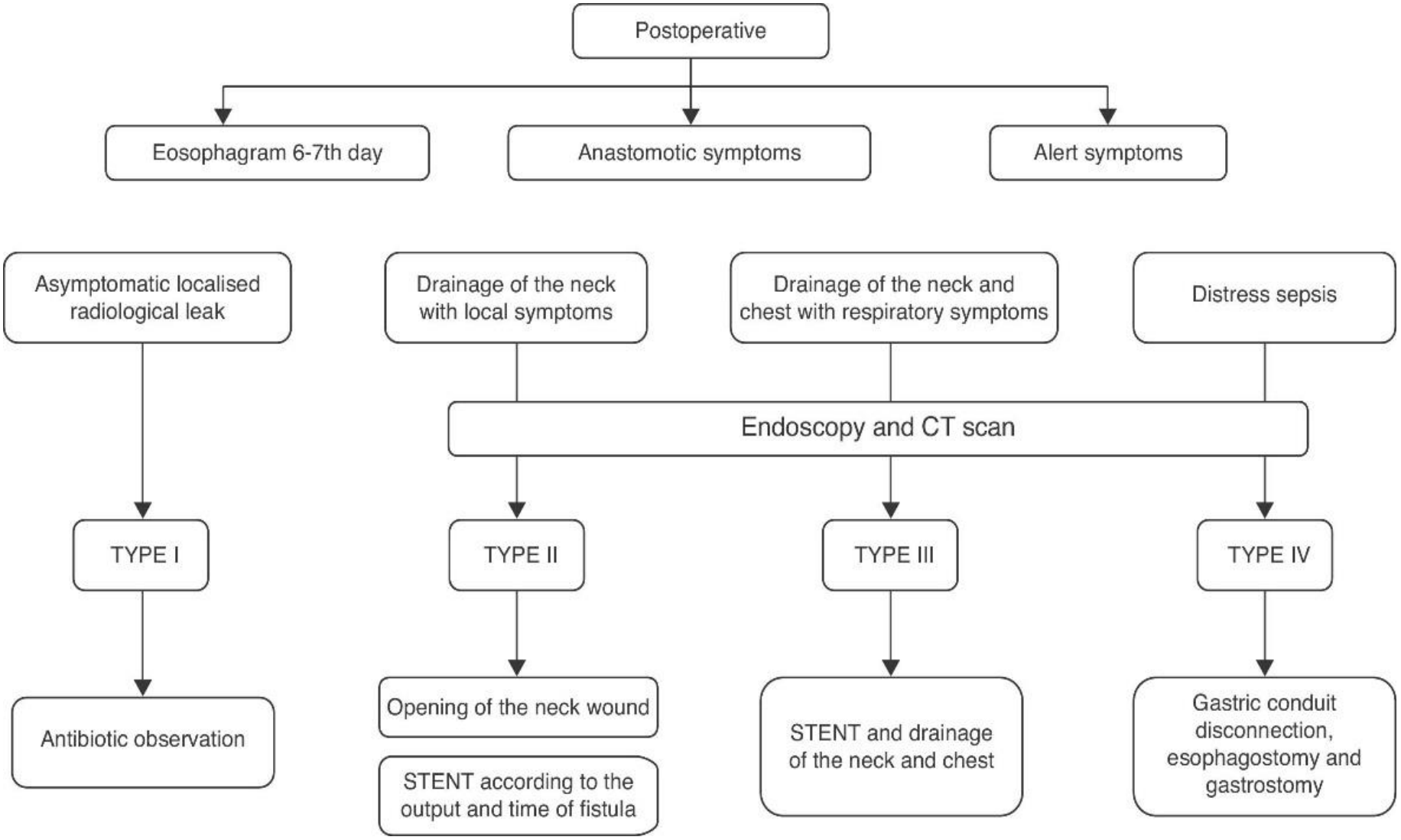
Messager, M, EJSO 43 (2017)

Proposed treatment algorithm for the management of an esophagogastric leak



Messager, M, EJSO 43 (2017)

Management of cervical anastomotic leak



Factors impacting esophagogastric anastomotic healing

I. Systemic

- Severe malnutrition
- Hypovolemia/hypotension
- Heart failure
- Hypertension
- Renal insufficiency
- Coronary disease
- Vascular disease
- Steroid use
- Diabetes mellitus
- Tobacco use
- Systemic chemotherapy

II. Local

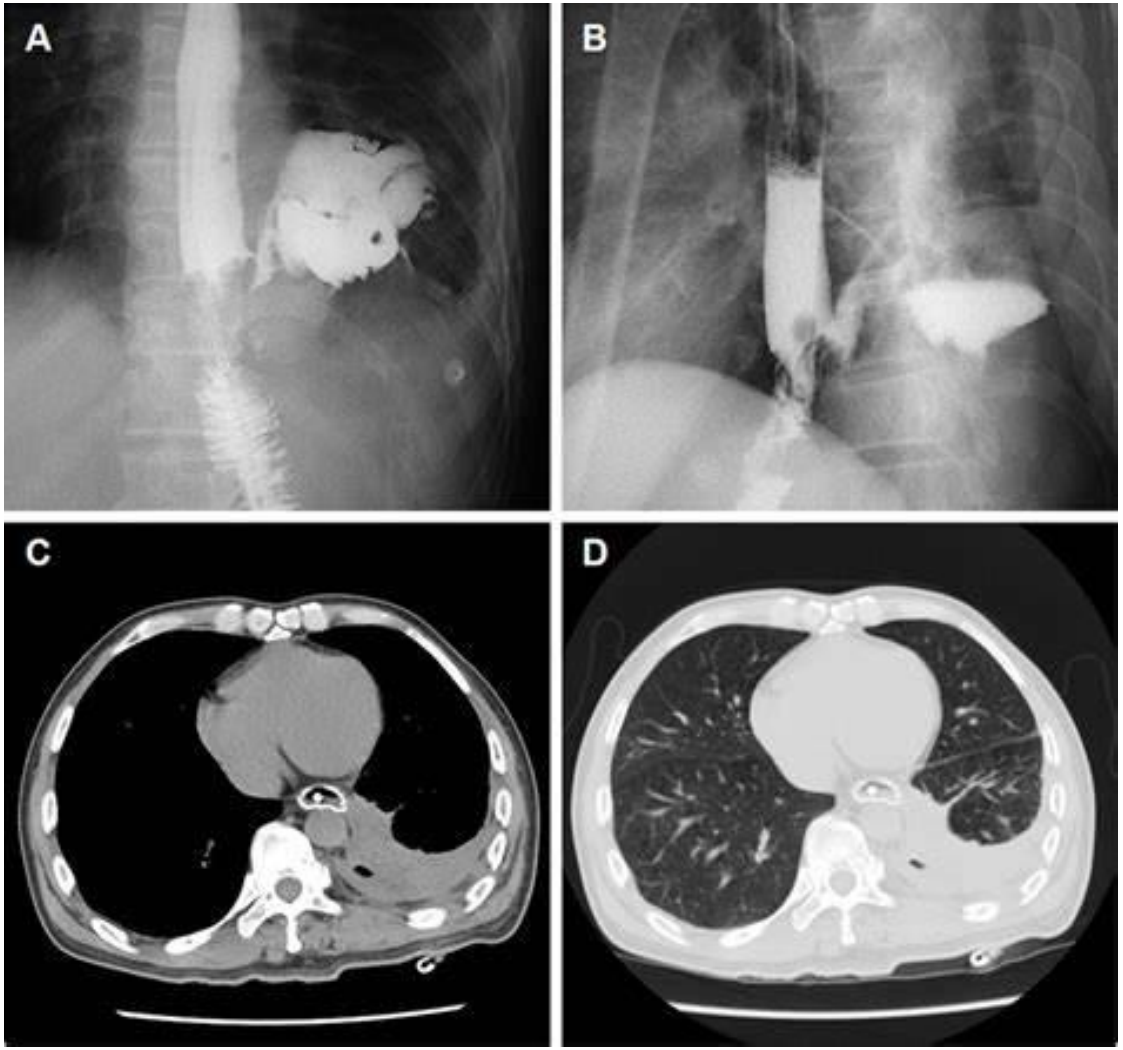
- Arterial insufficiency
- Venous compromise
- Gastric trauma/inflammation/fibrosis
- Extrinsic compression
- Gastric distention
- Infection
- Radiation therapy

III. Technical

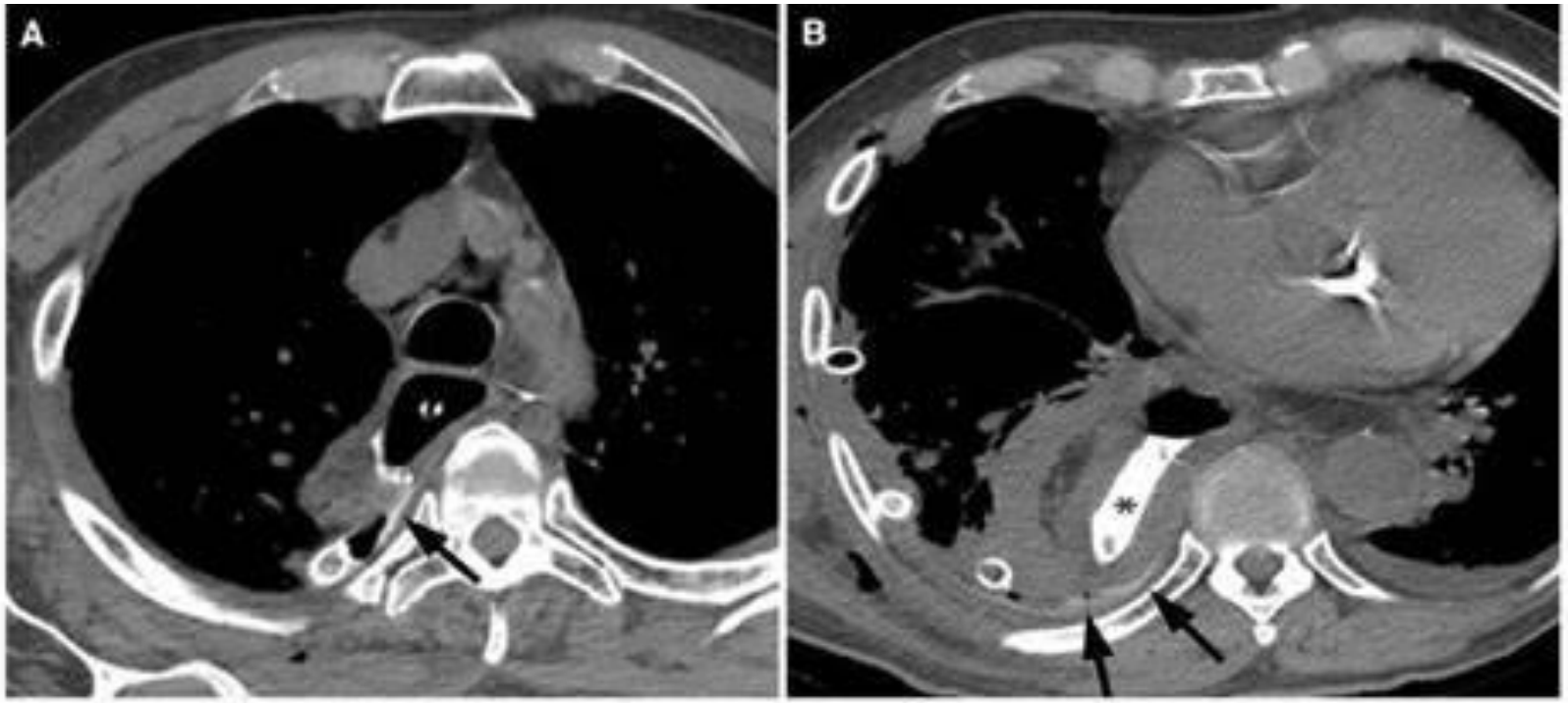
- Tension
- Anastomotic location
- Anastomotic technique
- Anastomotic buttressing
- Errors

Jones, C, Thorac Surg Clin 25 (2015)

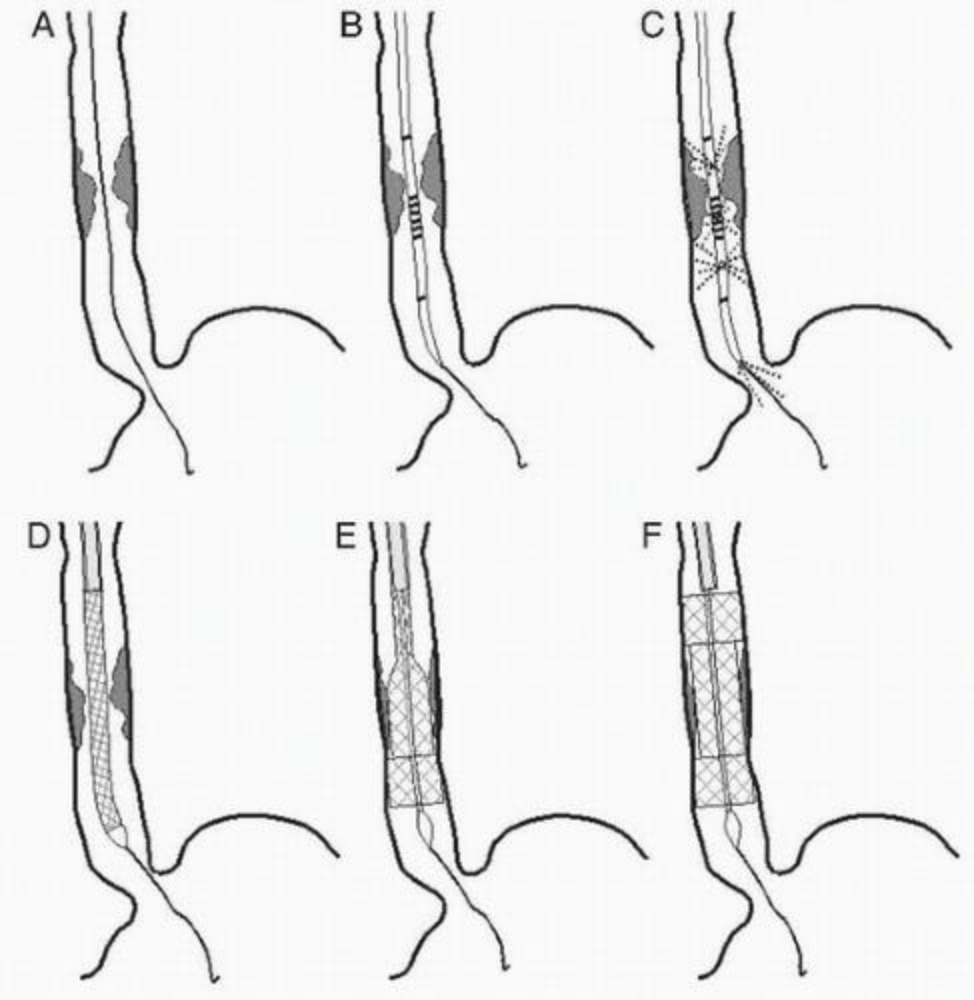
Anastomotic leak



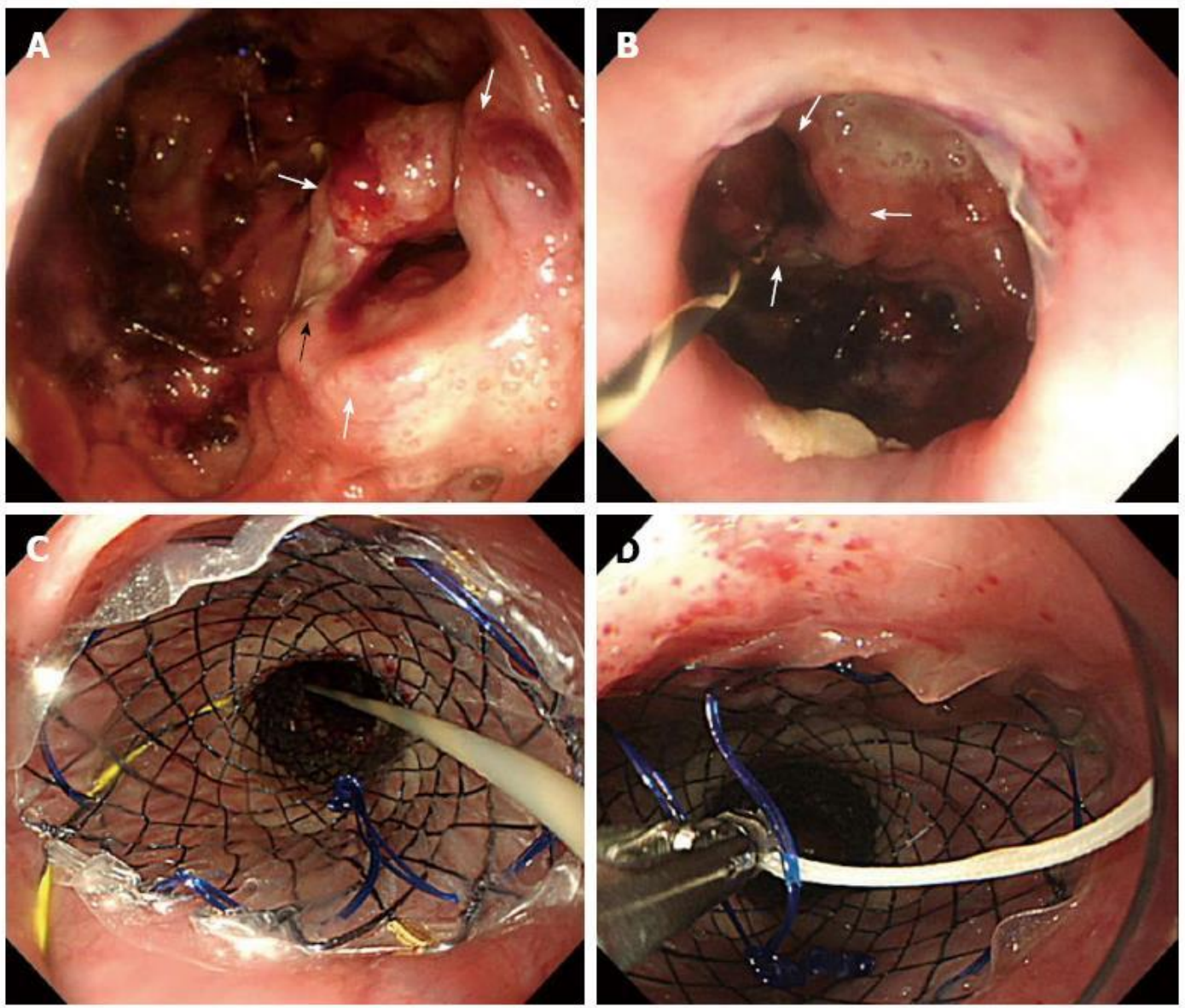
Esophageal anastomotic leak



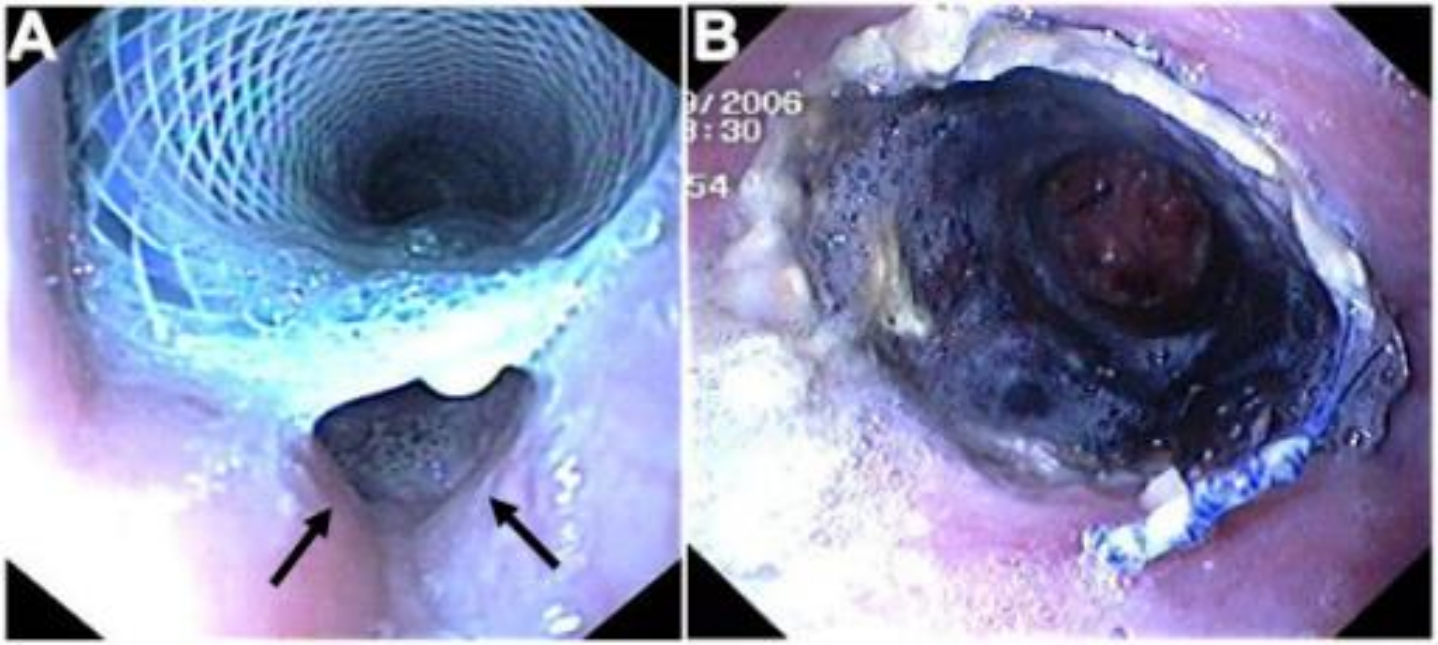
Esophageal stent placement



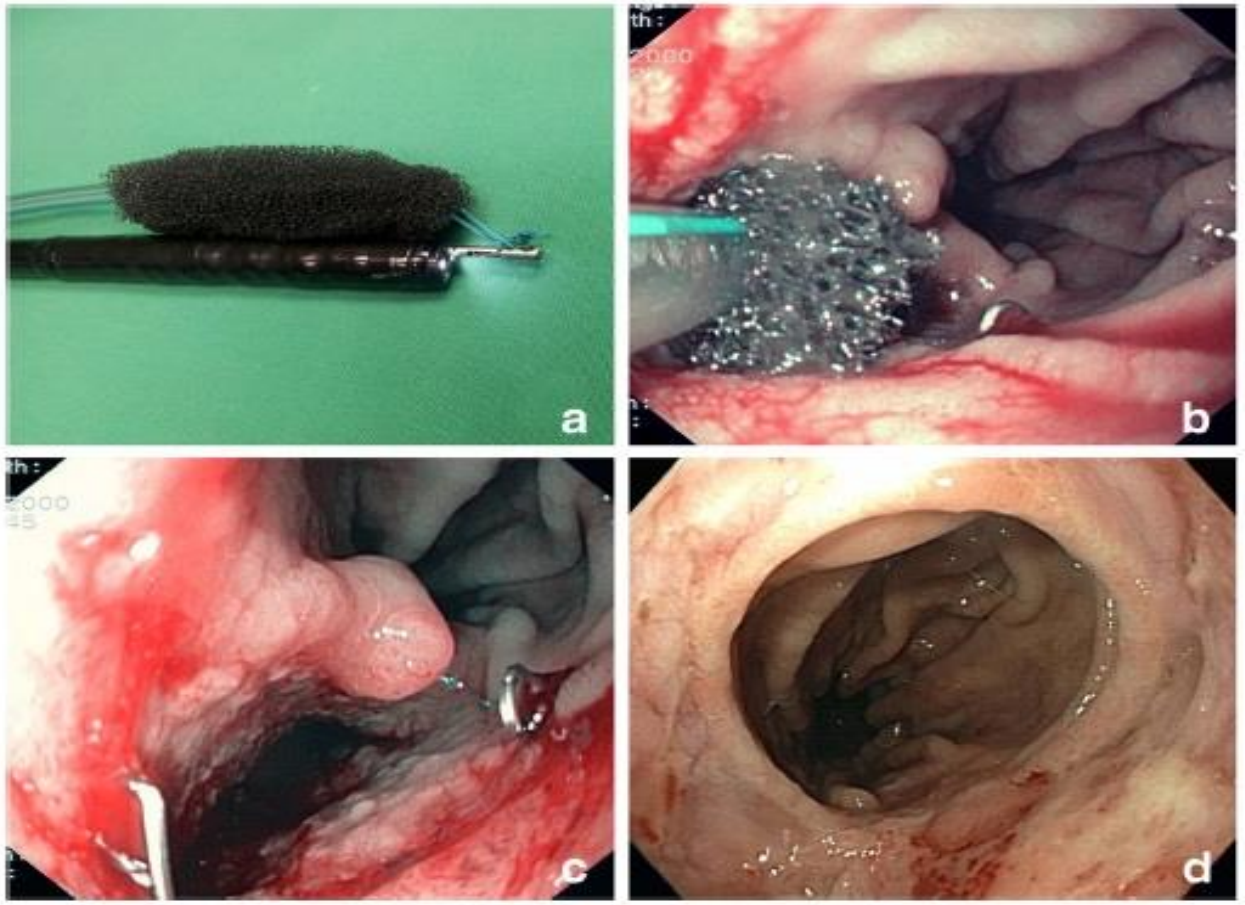
Endoscopic stent management of anastomotic leak



Endoscopic polyflex stent placement for anastomotic leak



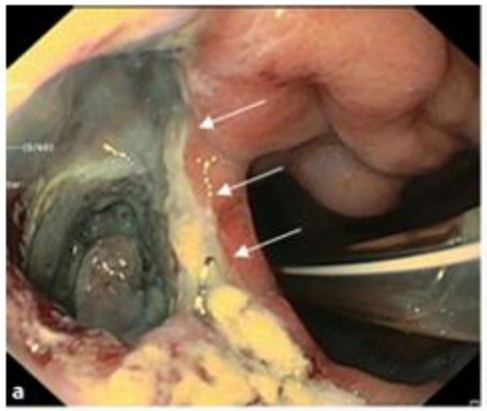
Endoscopic vacuum therapy for anastomotic leak

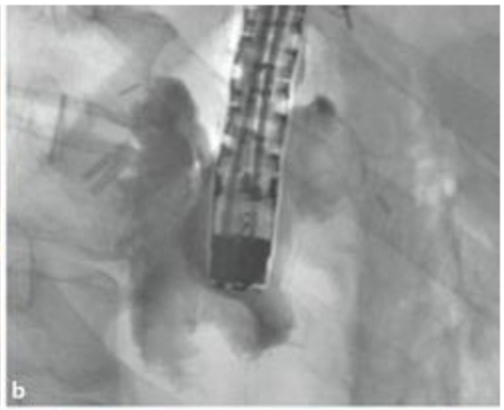


Mennigen, R, J Gastrointest Surg 19 (2015)

Endoscopic vacuum therapy for anastomotic leak

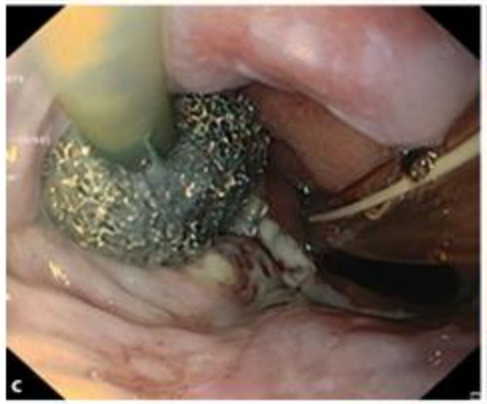
POD 10
3 X 2 cm cavity





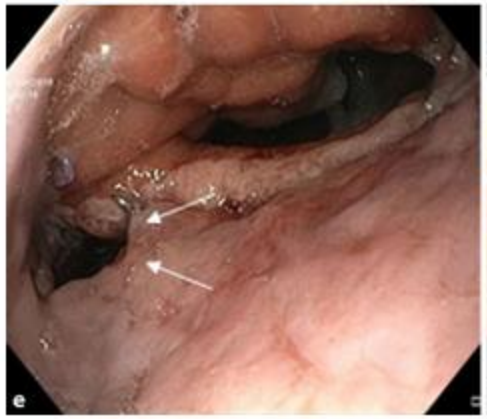
Fluoro: deep fistulas are excluded

Endoluminal vacuum therapy



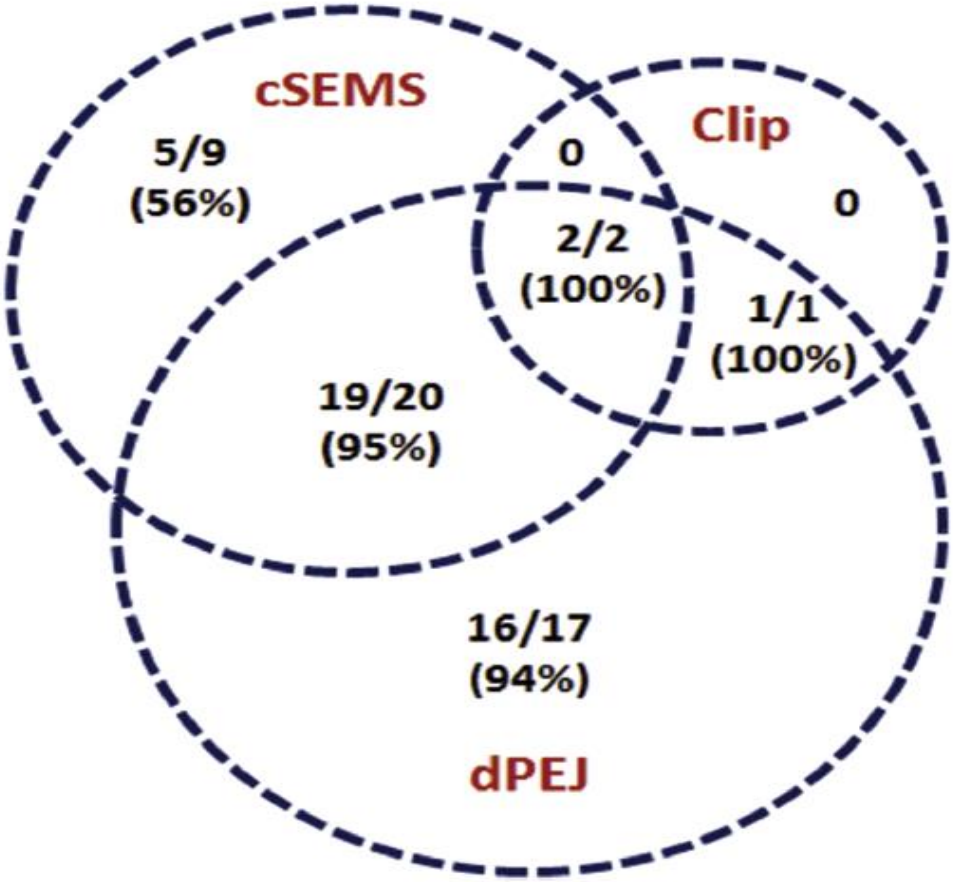
Granulation tissue

Cavity smaller after 10 days



Cavity nearly closed after 24 days

Endoscopic management of anastomotic leak



cSEMS = covered self expanding metal stent
dPEJ= direct percutaneous endosopic jejunostomy

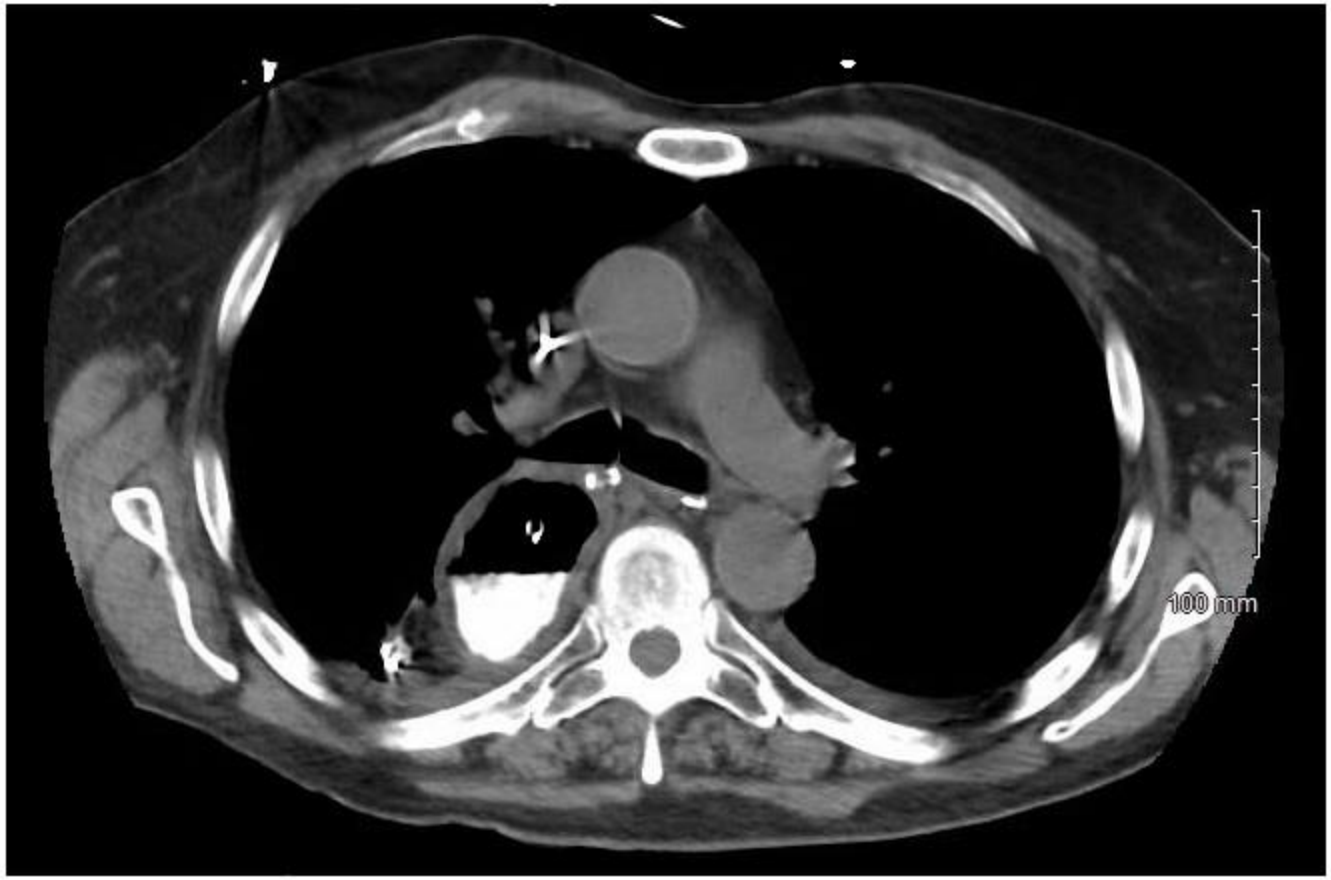
Licht, E, Ann Thorac Surg 101 (2016)

Large leak and some conduit necrosis
Unstable patient

Large leak and some conduit necrosis
Unstable patient

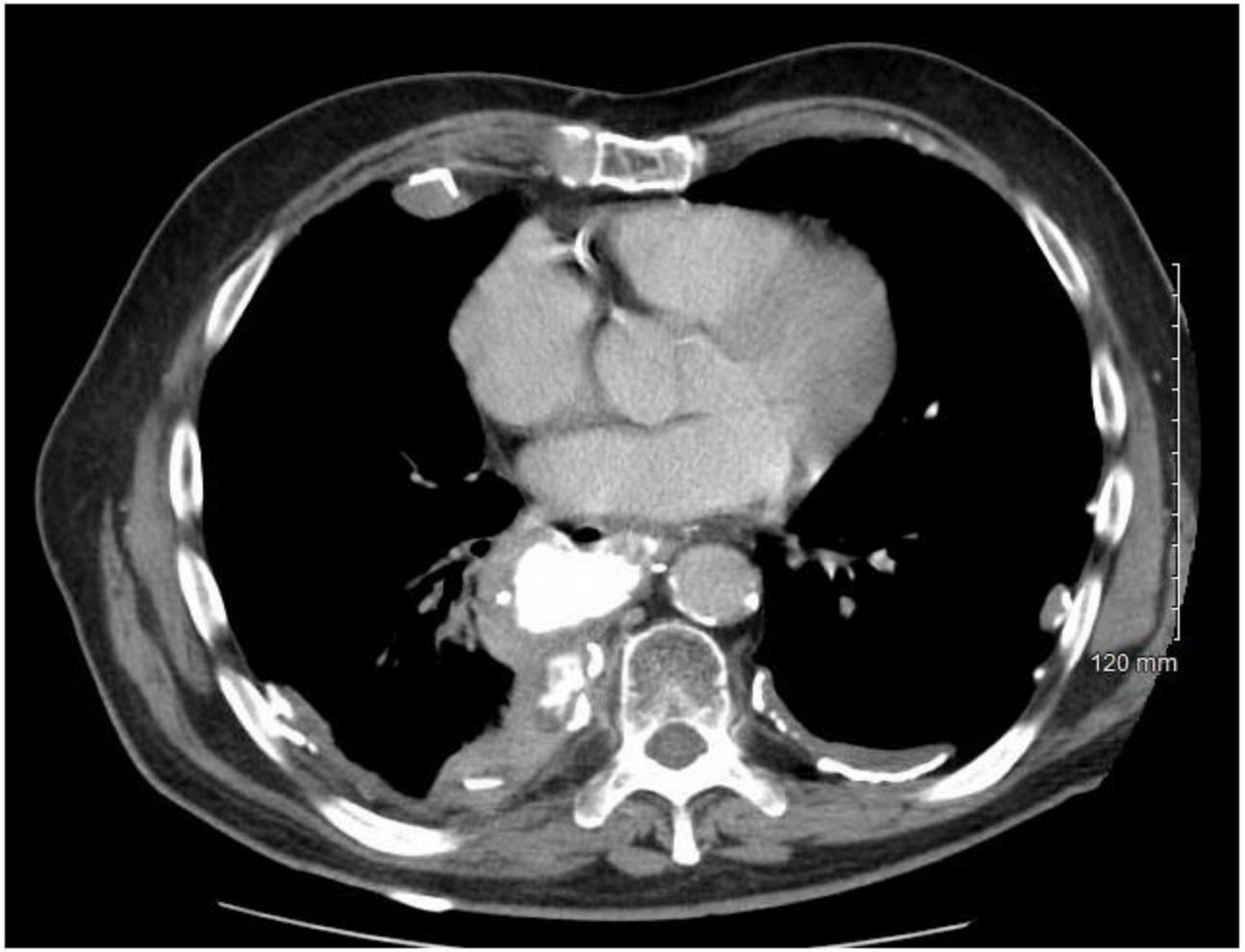
Small leak, stable patient

Small leak, stable patient
Endoscopic clip

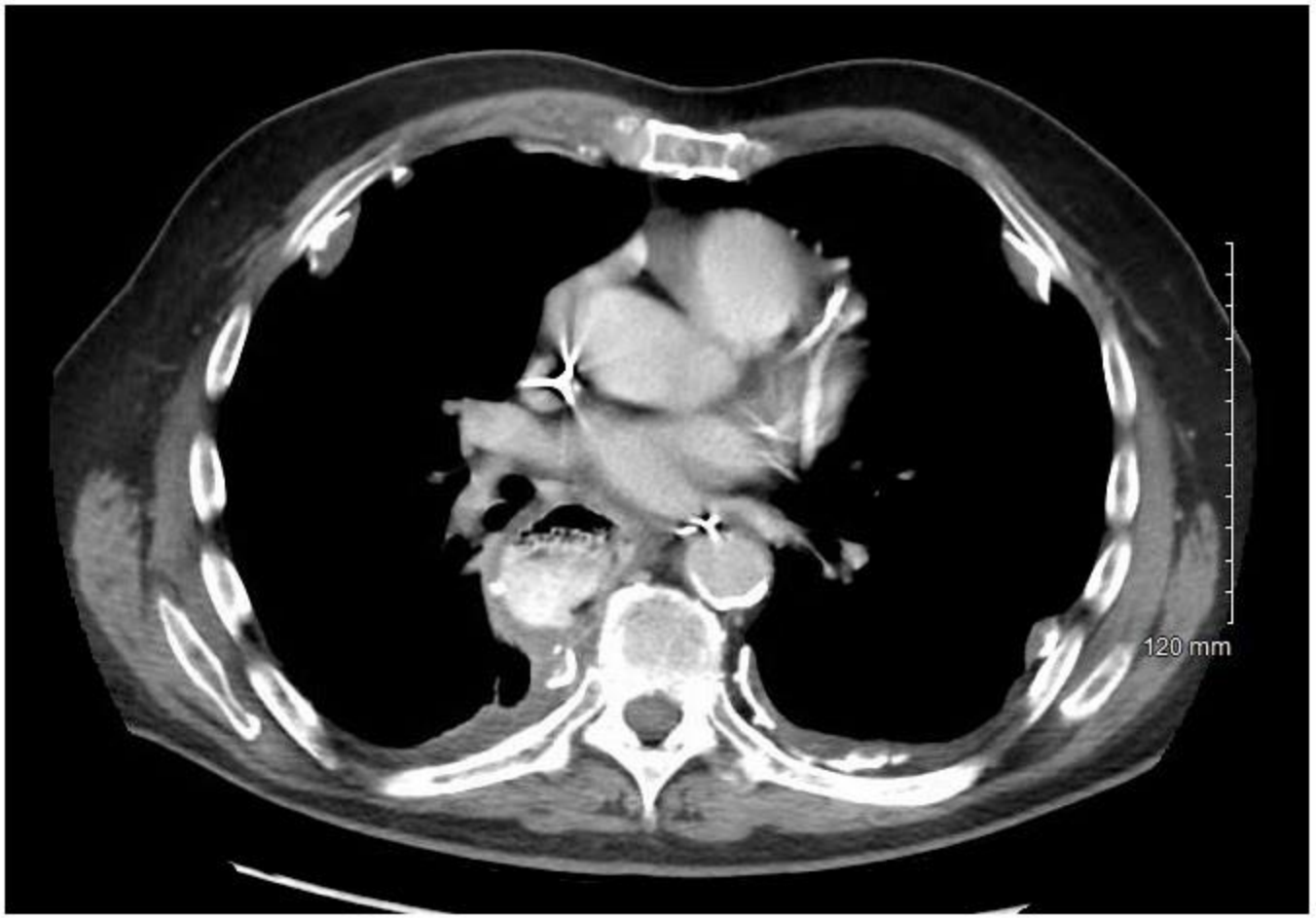


Contained leak, identified 5 weeks after surgery

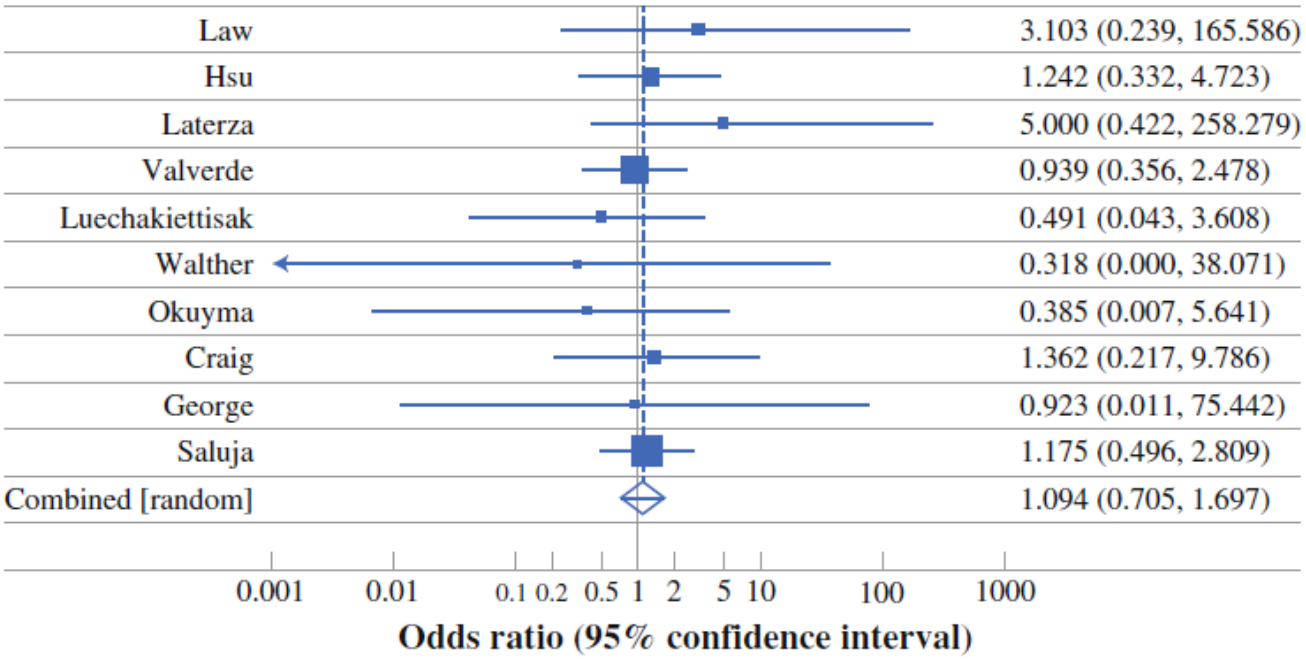
Contained leak, identified 5 weeks after surgery
Esophageal stent and percutaneous drain



Contained leak
Much improved



Forrest plot demonstrating no significant difference in anastomotic leak Between handsewn and stapled esophagogastric anastomosis



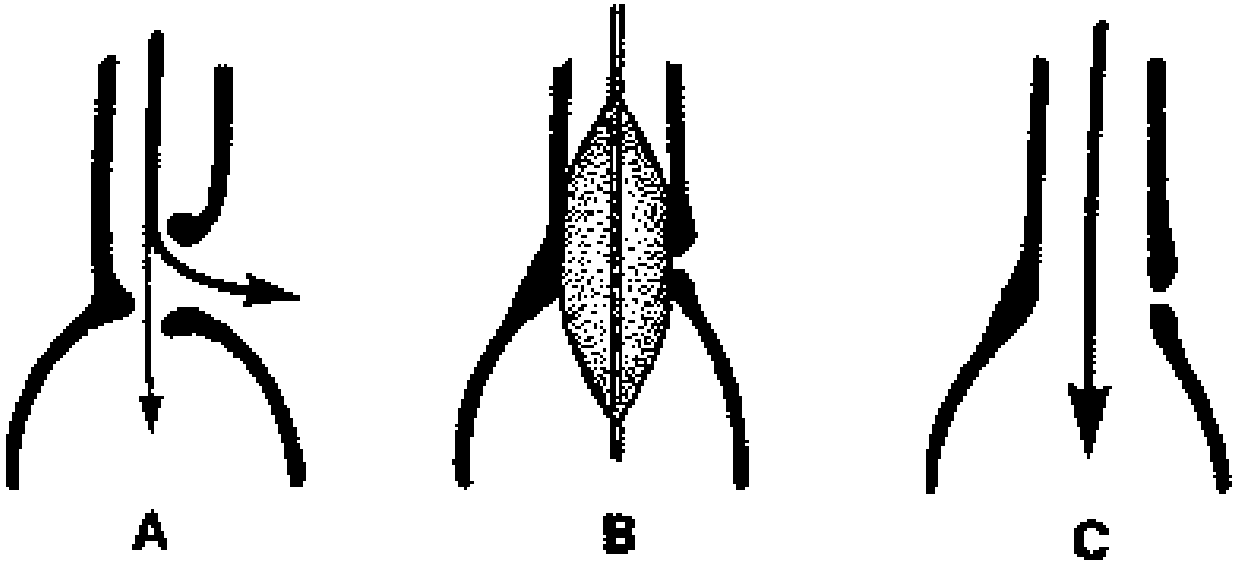
Jsheraz, R, Ann Surg Oncol 20 (2013)

Review of omental reinforcement following esophagectomy

Author	# patients	Anastomotic technique	Leak rate, n (%)	
			Omental flap	No omental flap
Bhat et al (2006)	194	Handsewn	3/97 (3)	14/97 (14)
Dai et al (2011)	255	Circular stapled	1/128 (1)	7/127 (6)
Sepesi et al(2012)	607	Stapled	10/215 (5)	41/392 (11)
Zheng et al (2013)	184	Handsewn	1/92 (3)	9/92 (10)

Schaheen, L, The American Journal of Surgery 208 (2014)

Leak with stricture



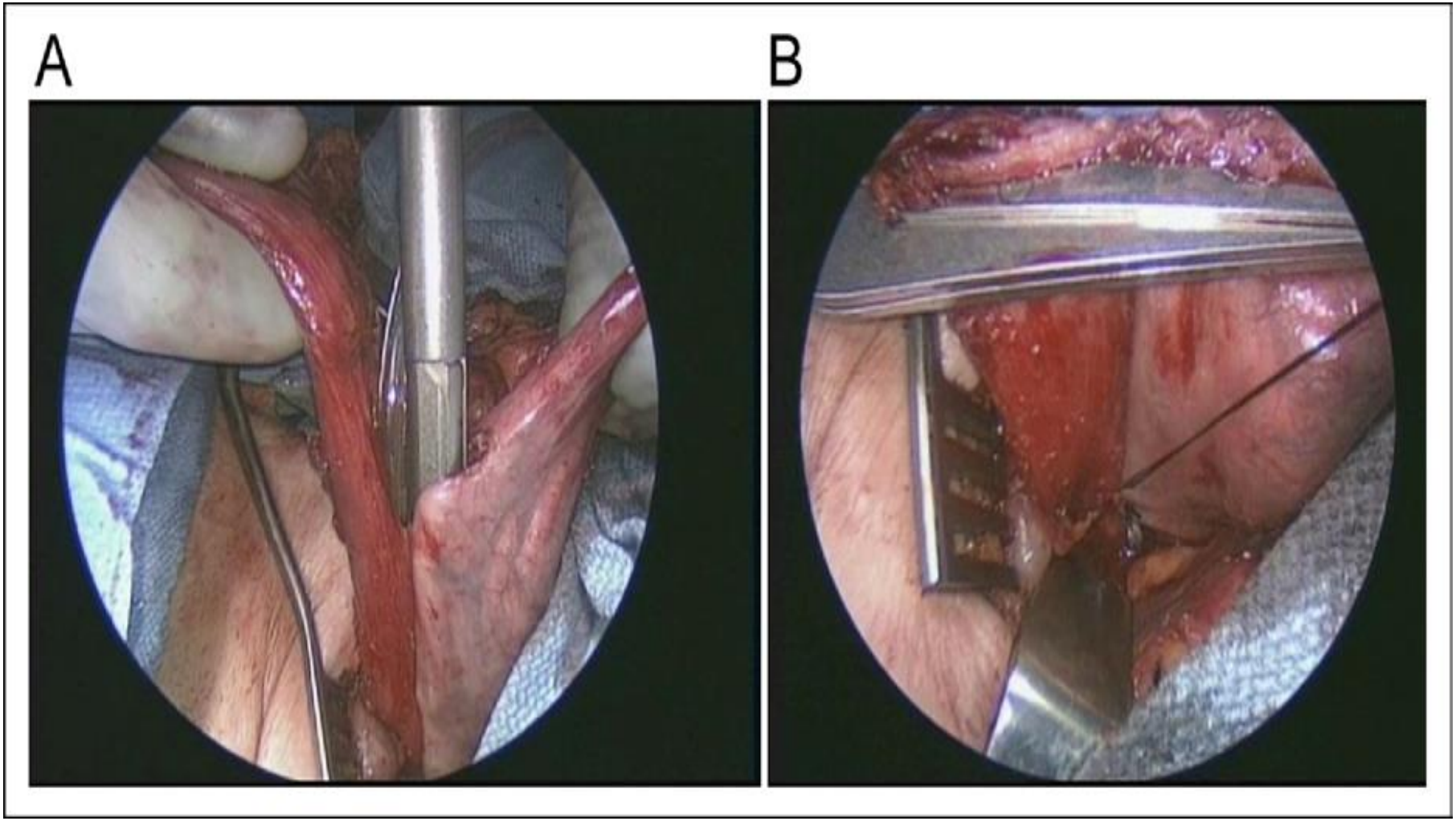
Avoid EEA, prefer side-to-side anastomosis

Minimally invasive esophagectomy with stapled side-to-side anastomosis (n=316)

Postoperative Outcomes	
Total hospital LOS, median (range):	8 (5-137)
Reoperation:	24 (7.6%)
Readmission within 30 days:	23 (7.3%)
In-hospital mortality:	3 (1%)
30-day mortality:	4 (1.3%)
90-day mortality:	16 (5%)

Ben-David, Tuttle and Hochwald, Ann Surg Onc, 23: 2016

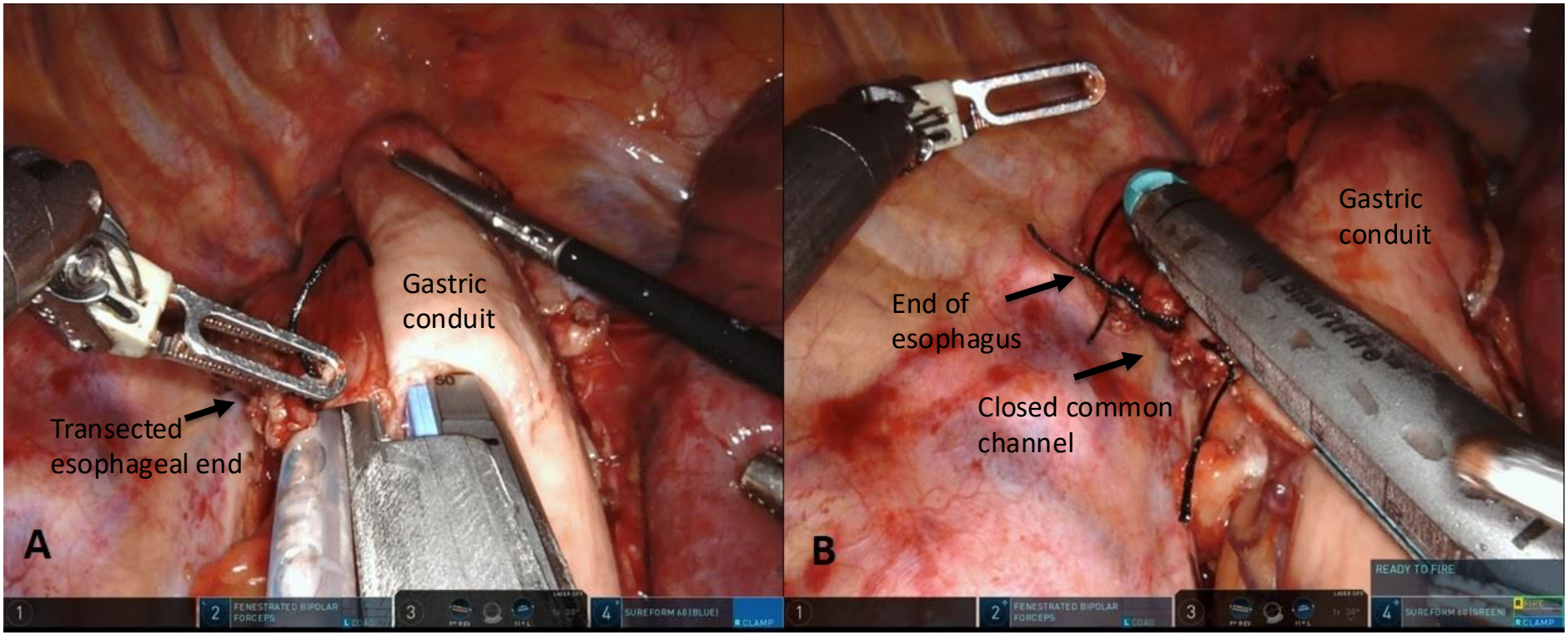
Cervical Anastomosis
n=247



Anastomotic leak occurred in 21 of 247 patients (8.5%) following a cervical anastomosis.

Ben-David, Tuttle and Hochwald, Ann Surg Onc, 23: 2016

Robotic stapled side to side intrathoracic anastomosis
Leak in 2/150 patients= 1%



Peng JS, Hochwald SN. Surg Oncol Clin N Am. 2019 Apr;28(2):177-200

Kukar M and Hochwald S, J Gastrointest Surgery, in press, 2025

Conclusions

Anastomotic problems following esophagectomy are more frequent than in other areas of the GI tract

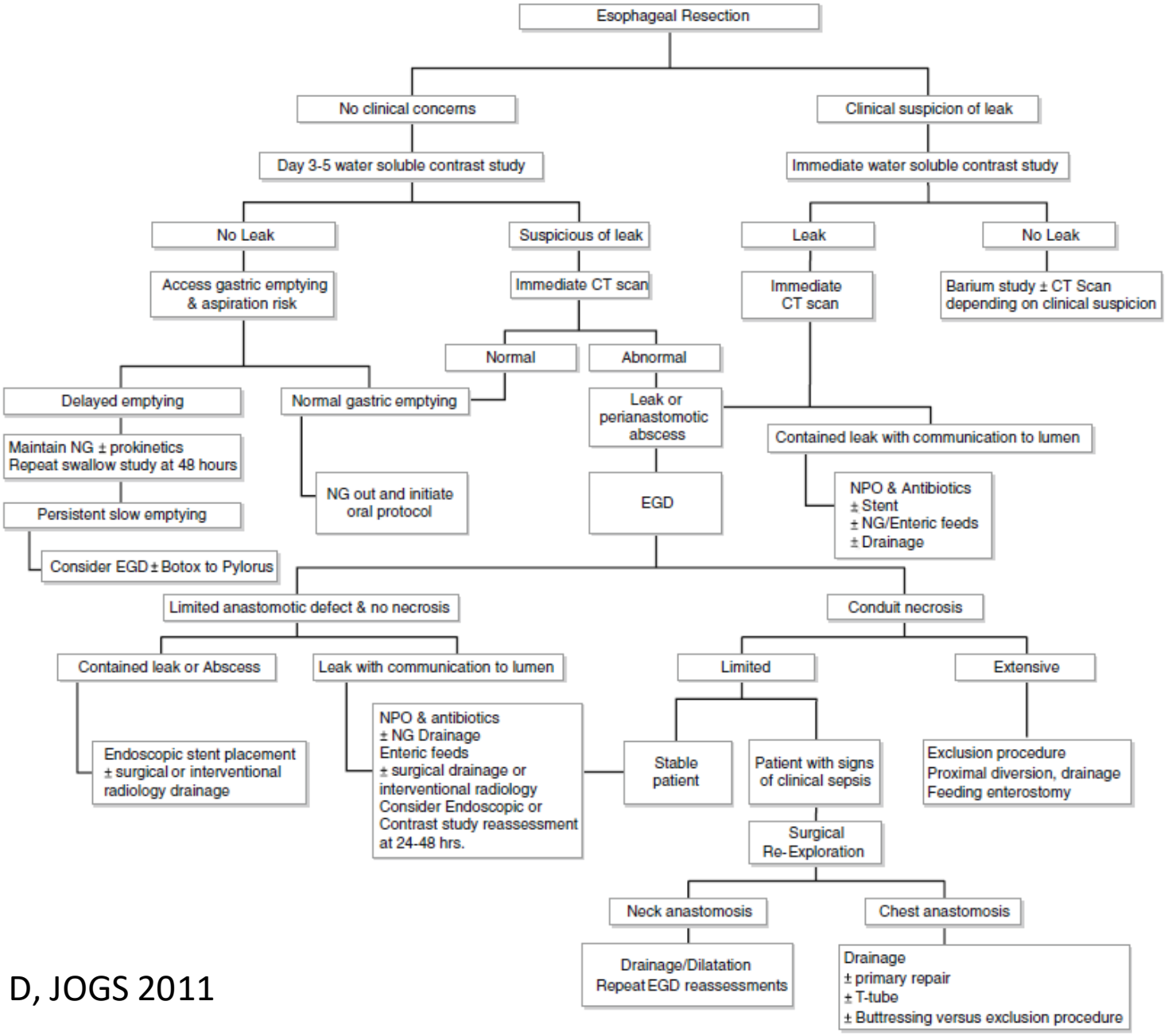
Vast majority do not need reoperative surgery

Clinical stability of patient is a critical factor to dictate intervention

Look for conduit necrosis, timing and size of defect

Manage with endoscopy and drainage

Diagnosis and management of esophageal leak



Low D, JOGS 2011