DSMC

Postopertive Complications on Esophageal Surgery

계명대학교 동산의료원
금 동 윤

- Systemic complications
  - pneumonia, ARDS
  - myocardial infarction
- Surgical procedure specific complication
  - anastomotic leaks, ischemia, stricture
  - chylothorax
  - recurrent laryngeal N. injury
  - dysphagia, reflux, delayed emptying, dumping

Risk factors

- Age
- Compromized pulmonary function(COPD)
- Malnutrition
- Renal and hepatic dysfunction
- Emergency surgery
- Cf. benign vs malignant
- Co-morbid (diabetes, obese…)

Predictors of Major Morbidity or Mortality After Resection for Esophageal Cancer: A Society of Thoracic Surgeons General Thoracic Surgery Database Risk Adjustment Model

Daniel P. Raymond, MD, Christopher W. Seder, MD, Cameron D. Wright, MD, Mitchell J. Magee, MD, Andrzej S. Kosinski, PhD, MS, Stephen D. Cassivi, MD, Eric L. Grogan, MD, Shanda H. Blackmon, MD, Mark S. Allen, MD, Bernard J. Park, MD, William R. Burfeind, MD, Andrew C. Chang, MD, Malcolm M. DeCamp, MD, David W. Wormuth, MD, Felix G. Fernandez, MD, and Benjamin D. Kozower, MD

Background. The purpose of this analysis was to revise the model for perioperative risk for esophagectomy for cancer utilizing The Society of Thoracic Surgeons General Thoracic Surgery Database to provide enhanced risk stratification and quality improvement measures for contributing centers.

Methods. The Society of Thoracic Surgeons General Thoracic Surgery Database was queried for all patients treated for esophageal cancer with esophagectomy between July 1, 2011, and June 30, 2014. Multivariable risk models for major morbidity, perioperative mortality, and combined morbidity and mortality were created with the inclusion of surgical approach as a risk factor.

Results. In all, 4,321 esophagectomies were performed by 164 participating centers. The most common procedures included Ivor Lewis (32.5%), transhiatal (21.7%), minimally invasive esophagectomy, Ivor Lewis type (21.4%), and McKeown (10.0%). Sixty-nine percent of patients received induction therapy. Perioperative mortality (inpatient and 30-day) was 135 of 4,321 (3.4%). Major morbidity occurred in 1,429 patients (33.1%). Major morbidities include unexpected return to operating (15.6%), anastomotic leak (12.9%), reintubation (12.2%), initial ventilation beyond 48 hours (3.5%), pneumonia (12.2%), renal failure (2.0%), and recurrent laryngeal nerve paresis (2.0%). Statistically significant predictors of combined major morbidity or mortality included age more than 65 years, body mass index 35 kg/m^2 or greater, preoperative congestive heart failure, Zubrod score greater than 1, McKeown esophagectomy, current or former smoker, and squamous cell histology.

Conclusion. Thoracic surgeons participating in The Society of Thoracic Surgeons General Thoracic Surgery Database perform esophagectomy with low morbidity and mortality. McKeown esophagectomy is an independent predictor of combined postoperative morbidity or mortality. Revised predictors for perioperative outcome were identified to facilitate quality improvement processes and hospital comparisons.

(Ann Thorac Surg 2016;102:207–14)

Mortality

- Overall in-hospital mortality/ overall 30-day mortality
- Major risk: pneumonia, age, anastomotic complications
- Minor: ascites, age, diabetes, neoadjuvant therapy, renal dysfunction, hepatic dysfunction
- Lower volume hospital(4-10)/high volume (9-40)

systemic complications

Pulmonary complications

pneumonia
COPD exacervation
ARDS
pulmonary thromboembolism

- Preop resp rehabilitation
- postop lung expansion maneuver
- oral hygiene, bronchial toilet
- pain management
- special caution on neck incision patient
- High incidence on thoracotomy, low in minimal invasive surgery(MIS)

Aspiration

recurrent n. injury

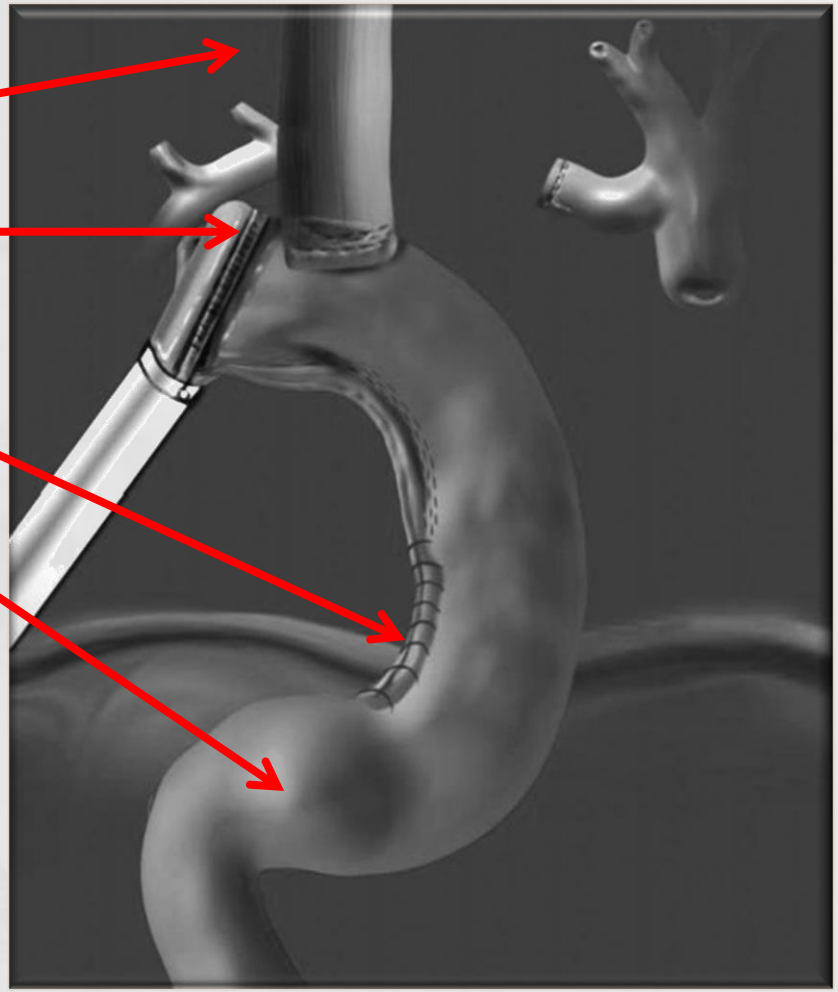
anastomotic stricture

hiatus narrowing

pylorus narrowing

post-extubated state

regurgitation



Cardiac

- AF:

esophagectomy and postop AF:
→significantly higher rates of pul cx, anastomotic leaks, mortality rates

- MI:

Procedure specific complications

- Conduit complication (anastomotic leak, ischemia, stricture)- reduced conduit perfusion(upto 70%)
- Nerve injury
- Lymphatic leak(chylothorax)
- Diaphragmic hernia
- Airway injury
- Tracheoesophageal injury
- Splenic injury

Avoiding Complications -Surgical Parameters

- The conduit(usually stomach) needs to be:
  - Well-vascularized
  - Adequately mobilized (reduce tension)
  - Treated gently
  - Ischemic portion resected
- The anastomosis needs to be:
  - Sufficiently wide
  - Closed securely (water-tight)

Surgical Factors Proposed as Affecting Anastomosis

- Anatomical Location (neck, chest)
  - Physical constraints
    - Space
    - Tension
    - Distance (available proximal esophagus)
- Type of operation (open vs MIE)
- Conduit used (whole vs tube)
- Trauma while handling the conduit
- Technique (incorporating mucosa, no excessive sutures)
- Coverage of anastomosis (omentum)
- Surgeon's experience
- Blood loss
- Running suture vs. interrupted vs. 2 layers

Comparison between different reconstruction routes in esophageal squamous cell carcinoma

Yu-Zhen Zheng, Shu-Qin Dai, Wei Li, Xun Cao, Xin Wang, Jian-Hua Fu, Peng Lin, Lan-Jun Zhang, Bin Lu, Jun-Ye Wang

Abstract

AIM: To compare postoperative complications and prognosis of esophageal squamous cell carcinoma patients treated with different routes of reconstruction.

METHODS: After obtaining approval from the Medical Ethics Committee of the Sun Yat-Sen University Cancer Center, we retrospectively reviewed data from 306 consecutive patients with histologically diagnosed esophageal squamous cell carcinoma who were treated between 2001 and 2011. All patients underwent radical McKeown-type esophagectomy with at least two-field lymphadenectomy. Regular follow-up was performed in our outpatient department. Postoperative complica-

RESULTS: The posterior mediastinal and retrosternal reconstruction routes were employed in 120 and 186 patients, respectively. Pulmonary complications were the most common complications experienced during the postoperative period (46.1% of all patients; 141/306). Compared to the retrosternal route, the posterior mediastinal reconstruction route was associated with a lower incidence of anastomotic stricture (15.8% *vs* 27.4%, $P = 0.018$) and less surgical bleeding (242.8 ± 114.2 mL *vs* 308.2 ± 168.4 mL, $P < 0.001$). The median survival time was 26.8 mo (range: 1.6-116.1 mo). Upon uni/multivariate analysis, a lower preoperative albumin level ($P = 0.009$) and a more advanced pathological stage (pT; $P = 0.006$; pN; $P < 0.001$) were identified as independent factors predicting poor prognosis. The reconstruction route did not influence prognosis ($P = 0.477$).

CONCLUSION: The posterior mediastinal route of reconstruction reduces incidence of postoperative complications but does not affect survival. This route is recommended for resectable esophageal squamous cell carcinoma.

World J Surg (2015) 39:433–440
DOI 10.1007/s00268-014-2819-1

World Journal of Surgery

ORIGINAL SCIENTIFIC REPORT

Impact of the Route of Reconstruction on Post-operative Morbidity and Malnutrition after Esophagectomy: A Multicenter Cohort Study

Makoto Yamasaki · Hiroshi Miyata · Takushi Yasuda · Osamu Shiraishi · Tsuyoshi Takahashi · Masaaki Motoori · Masahiko Yano · Hitoshi Shiozaki · Masaki Mori · Yuichiro Doki

Abstract

Background Reconstruction after esophagectomy is mainly performed through the retrosternum (RS) or posterior mediastinum (PM). However, the best approach is not clear. This study aimed to assess the impact of the route of gastric conduit reconstruction, after esophagectomy for esophageal squamous cell carcinoma (ESCC), on post-operative outcomes.

Methods We analyzed 298 patients who underwent radical esophagectomy for ESCC at three high volume centers between 2008 and 2009. Among them, the RS was selected in 166 patients and PM in 118; while, the antethoracic route was used in 14 patients. Post-operative morbidity, mortality, and long-term outcome were compared.

Results There were no differences between patients of the two routes with respect to operative blood loss (RS: 753 ± 519, PM: 748 ± 414 g) and post-operative complications, including pulmonary problems (RS: 15 %, PM: 10.2 %) and anastomotic leakage (RS: 9.0 %, PM: 5.1 %); although, the operating time (RS: 566 ± 97, PM: 472 ± 79 min; $p < 0.0001$) was shorter in the PM group than the RS group. The percentage weight loss after surgery was significantly less in the PM group than the RS group at 1 year (8.6 vs. 11.1 %; $p = 0.025$); although, the percentage at discharge was not different between the groups (PM: 4.9 %, RS: 6.3 %; $p = 0.072$). Multivariate analysis identified pre-operative body weight and the reconstruction route as significant and independent factors associated with 1-year weight loss.

Conclusions The results indicate gastric tube reconstruction through the posterior mediastinal route after esophagectomy may relieve post-operative 1-year malnutrition without increasing post-operative complications.

Minimally Invasive Versus Open Esophagectomy for Esophageal Cancer: A Comparison of Early Surgical Outcomes From The Society of Thoracic Surgeons National Database

Smita Sihag, MD, Andrzej S. Kosinski, PhD, Henning A. Gaissert, MD, Cameron D. Wright, MD, and Paul H. Schipper, MD

Department of Thoracic Surgery, Massachusetts General Hospital, Boston, Massachusetts, Department of Biostatistics and Bioinformatics, Duke University Medical Center and Duke Clinical Research Institute, Durham, North Carolina, and Department of Cardiothoracic Surgery, Oregon Health & Sciences University Medical Center, Portland, Oregon

Background. Open esophagectomy results in significant morbidity and mortality. Minimally invasive esophagectomy (MIE) has become increasingly popular at specialized centers with the aim of improving perioperative outcomes. Numerous single-institution studies suggest MIE may offer lower short-term morbidity. The two approaches are compared using a large, multi-institutional database.

Methods. The Society of Thoracic Surgeons (STS) National Database (v2.081) was queried for all resections performed for esophageal cancer between 2008 and 2011 (n = 3,780). Minimally invasive approaches included both transhiatal (n = 214) and Ivor Lewis (n = 600), and these were compared directly with open transhiatal (n = 1,065) and Ivor Lewis (n = 1,291) procedures, respectively. Thirty-day outcomes were examined using nonparametric statistical testing.

Results. Both open and MIE groups were similar in terms of preoperative risk factors. Morbidity and all-cause mortality were equivalent at 62.2% and 3.8%. MIE was associated with longer median procedure times (443.0 versus 312.0 minutes; $p < 0.001$), but a shorter median length of hospital stay (9.0 versus 10.0 days; $p < 0.001$). Patients who underwent MIE had higher rates of reoperation (9.9% versus 4.4%; $p < 0.001$) and empyema (4.1% versus 1.8%; $p < 0.001$). Open technique led to an increased rate of wound infections (6.3% versus 2.3%; $p < 0.001$), postoperative transfusion (18.7% versus 14.1%; $p = 0.002$), and ileus (4.5% versus 2.2%; $p = 0.002$). Propensity score-matched analysis confirmed these findings. High- and low-volume centers had similar outcomes.

Conclusions. Early results from the STS National Database indicate that MIE is safe, with comparable rates of morbidity and mortality as open technique. Longer procedure times and a higher rate of reoperation following MIE may reflect a learning curve.

(Ann Thorac Surg 2016;101:1281–9)

Patient Factors that May Affect Anastomosis

- Nutritional status (albumin/pre-albumin)
- Prior radiation +/-chemotherapy
- Diabetes
- Vascular disease
- Hypotension
- Hypoxemia
- Obesity/Body and neck habitus
- Gender
- Smoking history
- Prior gastric or esophagael surgery

Anastomotic Methods

- Hand-sewn
- Linear-stapled
- Circular-stapled
- Hybrid

leaks

- Decreaed conduit perfusion(70%) on proximal end of gastric conduit→breakdown, leak,stricture
- Esophageal resection후 5-40%
  (mortality: 2-12%)
- Factors
  - anastomosis technique(hand/stapled/hybrid)
  - Location of anastomosis(neck vs chest)
  - Type of conduit(stomach vs colon vs jejunum)
  - Location of conduit(orthotopic vs heterotopic)

Predictors of Anastomotic Leak After Esophagectomy: An Analysis of The Society of Thoracic Surgeons General Thoracic Database

Edmund S. Kassis, MD, Andrzej S. Kosinski, PhD, Patrick Ross, Jr, MD, PhD, Katherine E. Koppes, PA-C, James M. Donahue, MD, and Vincent C. Daniel, MD

Division of Thoracic Surgery, The Ohio State University Medical Center, Columbus, Ohio; Department of Biostatistics and Bioinformatics, Duke University, Durham, North Carolina; and Division of Thoracic Surgery, The University of Maryland Medical Center, Baltimore, Maryland

Background. Anastomotic leak is an important cause of morbidity and mortality after esophagectomy. Few studies have targeted risk factors for the development of leak after esophagectomy. The purpose of this study is to use The Society of Thoracic Surgeons Database to identify variables associated with leak after esophagectomy.

Methods. The Society of Thoracic Surgeons Database was queried for patients treated with esophagectomy for esophageal cancer between 2001 and 2011. Univariate and multivariate analysis of variables associated with an increased risk anastomotic leak was performed.

Results. There were 7,595 esophagectomies, with 804 (10.6%) leaks. Thirty-day mortality and length of stay were higher for patients with anastomotic leak. Mortality in patients requiring surgical management was 11.6% (38 of 327) compared with 4.4% (20 of 458) in medically managed leaks ($p < 0.001$). The leak rate was higher in patients with cervical anastomosis compared with those with intrathoracic anastomoses, 12.3% versus 9.3%, respectively ($p = 0.006$). There was no difference in leak-associated mortality between the two approaches. Factors associated with leak on univariate analysis include obesity, heart failure, coronary disease, vascular disease, hypertension, steroids, diabetes, renal insufficiency, tobacco use, procedure duration greater than 5 hours, and type of procedure ($p < 0.05$). Multivariable regression analysis associated heart failure, hypertension, renal insufficiency, and type of procedure as risk factors for the development of leak ($p < 0.05$).

Conclusions. Anastomotic leak after esophagectomy is an important cause of postoperative mortality and increased length of stay. We have identified important risk factors for the development of esophageal anastomotic leak after esophagectomy. Further studies aimed at risk reduction are warranted.

(Ann Thorac Surg 2013;96:1919–26)

Table 1. Esophagogastric Anastomotic Leak Classification[a]

Grade	Leak Classification	Definition	Treatment
I	Radiologic	• No clinical signs or symptoms • Purely radiologic diagnosis	• No change in management
II	Clinical minor	• Minor clinical signs (eg, cervical wound inflammation or drainage) • Radiographically contained intrathoracic leak • Fever, leukocytosis	• Delay oral intake • Antibiotics • Wound drainage • CT-guided drain placement
III	Clinical major	• Significant anastomotic disruption requiring surgical revision • Minor anastomotic disruption with systemic sepsis	• Esophageal stent placement • Surgical debridement • Anastomotic revision
IV	Conduit necrosis	• Conduit necrosis necessitating esophageal diversion	• Conduit resection with esophageal diversion

Price et al. Ann thorac surg 2013;95:1154-61

Leaks

- Cervical(12.3%) > thoracic(9.3%) anastomosis (odds ratio 3.43)
- no mortality difference,
- high morbidity on mediastinal drainage

Table 6. Association of Anastomotic Location and Technique With Leak

Anastomotic Location and Technique	Leak n (%)	Odds Ratio (95% CI)	*P* Value	Overall *P* Value
Chest, n = 268	16 (6.0)	...		
CS, n = 48	4 (8.3)	1.5 (0.5–5.1)	0.50	...
HS, n = 43	2 (4.6)	0.8 (0.2–3.9)	0.80	0.73
LS, n = 177	10 (5.6)	1.0 (reference)		
MC, n = 0	0	...	...	...
Neck, n = 164	34 (20.7)	...	...	...
CS, n = 0	0	...	...	...
HS, n = 14	9 (64.3)	11.8 (3.3–41.7)	<0.001	...
LS, n = 83	11 (13.2)	1.0 (reference)	...	0.001
MC, n = 67	14 (20.9)	1.7 (0.7–4.1)	0.22	...

CI = confidence interval; CS = circular stapled; HS = hand sewn; LS = linear stapled; MC = modified Collard.

Price et al Ann Thorac Surg 2013;95:1154-1162

Analysis of 432 Anastomosis

Table 2. Relation of Esophageal Anastomotic Location and Technique

Anastomotic Location	CS n (%)	HS n (%)	LS n (%)	MC n (%)	Total n (%)
Chest	48 (11)	43 (10)	177 (41)	0	268 (62)
Neck	0	14 (3)	83 (19)	67 (16)	164 (38)
Total	48 (11)	57 (13)	260 (60)	67 (16)	432

CS = circular stapled; HS = hand sewn; LS = linear stapled; MC = modified Collard.

Table 4. Relation of Anastomotic Location and Grade of Leak

Anastomotic Location (n)	Grade I n (%)	Grade II n (%)	Grade III n (%)	Grade IV n (%)	Leak n (%)
Chest (268)	0	3 (1.1)	10 (3.7)	3 (1.1)	16 (5.9)
Neck (164)	2 (1.2)	24 (15)	7 (4.3)	1 (0.6)	34 (21)
Total	2	27	17	4	50

Price et al Ann Thorac Surg 2013;95:1154-1162

Leaks management

- Thoracic anastomotic leaks are more likely to require re-exploration
- Endoscopic stenting/transluminal vacuum therapy

Basic principle

- Vulnuerable to hypotension
- Adquately drainage(CT for extraluminal collection)
- NG tube and NPO
- Systemic antibiotics(antifungal)

The American Journal of Surgery (2014) 208, 536-543

The American Journal of Surgery®

Association of Women Surgeons

Optimal approach to the management of intrathoracic esophageal leak following esophagectomy: a systematic review

Lara Schaheen, M.D.[a], Shanda H. Blackmon, M.D., M.P.H.[b], Katie S. Nason, M.D., M.P.H.[a,*]

[a]Division of Thoracic and Foregut Surgery, University of Pittsburgh, Pittsburgh, PA, USA; [b]Division of General Thoracic Surgery, Department of Surgery, Mayo Clinic College of Medicine, Rochester, MN, USA

KEYWORDS:
Esophagectomy;
Postoperative complications;
Anastomotic leak;
Review;
Systematic;
Assessment;
Outcomes

Abstract

BACKGROUND: Recently, endoscopic interventions (eg, esophageal stenting) have been successfully used for the management of intrathoracic leak. The purpose of this systematic review was to assess the safety and efficacy of techniques used in the management of intrathoracic anastomotic leak.

DATA SOURCES: We performed a systematic review of MEDLINE, EMBASE, and PubMed to identify eligible studies analyzing management of intrathoracic esophageal leak following esophagectomy.

CONCLUSIONS: Intraoperative anastomotic drain placement was associated with earlier identification and resolution of anastomotic leak (mean 23.4 vs 80.7 days). In addition, reinforcement of the anastomosis with omentoplasty may reduce the incidence of anastomotic leak by nearly 50%. Endoscopic stent placement was associated with leak resolution in 72%; fatal complications were reported, however, and safety remains to be proven. Negative pressure therapy, a potentially useful tool, requires further study. If stenting and wound vacuum are used, undrained mediastinal contamination and persistent leak require surgical intervention.

Endoscopic Management of Esophageal Anastomotic Leaks After Surgery for Malignant Disease

Eugene Licht, MD, Arnold J. Markowitz, MD, Manjit S. Bains, MD, Hans Gerdes, MD, Emmy Ludwig, MD, Robin B. Mendelsohn, MD, Nabil P. Rizk, MD, Pari Shah, MD, Vivian E. Strong, MD, and Mark A. Schattner, MD

Departments of Medicine and Surgery, Memorial Sloan Kettering Cancer Center, New York, New York

Background. Esophageal anastomotic leaks after cancer surgery remain a major cause of morbidity and mortality. Endoscopic interventions, including covered metal stents (cSEMS), clips, and direct percutaneous endoscopic jejunostomy (dPEJ) tubes are increasingly used despite limited published data regarding their utility in this setting. This study aimed to determine the efficacy and safety of a multimodality endoscopic approach to anastomotic leak management after operation for esophageal or gastric cancer.

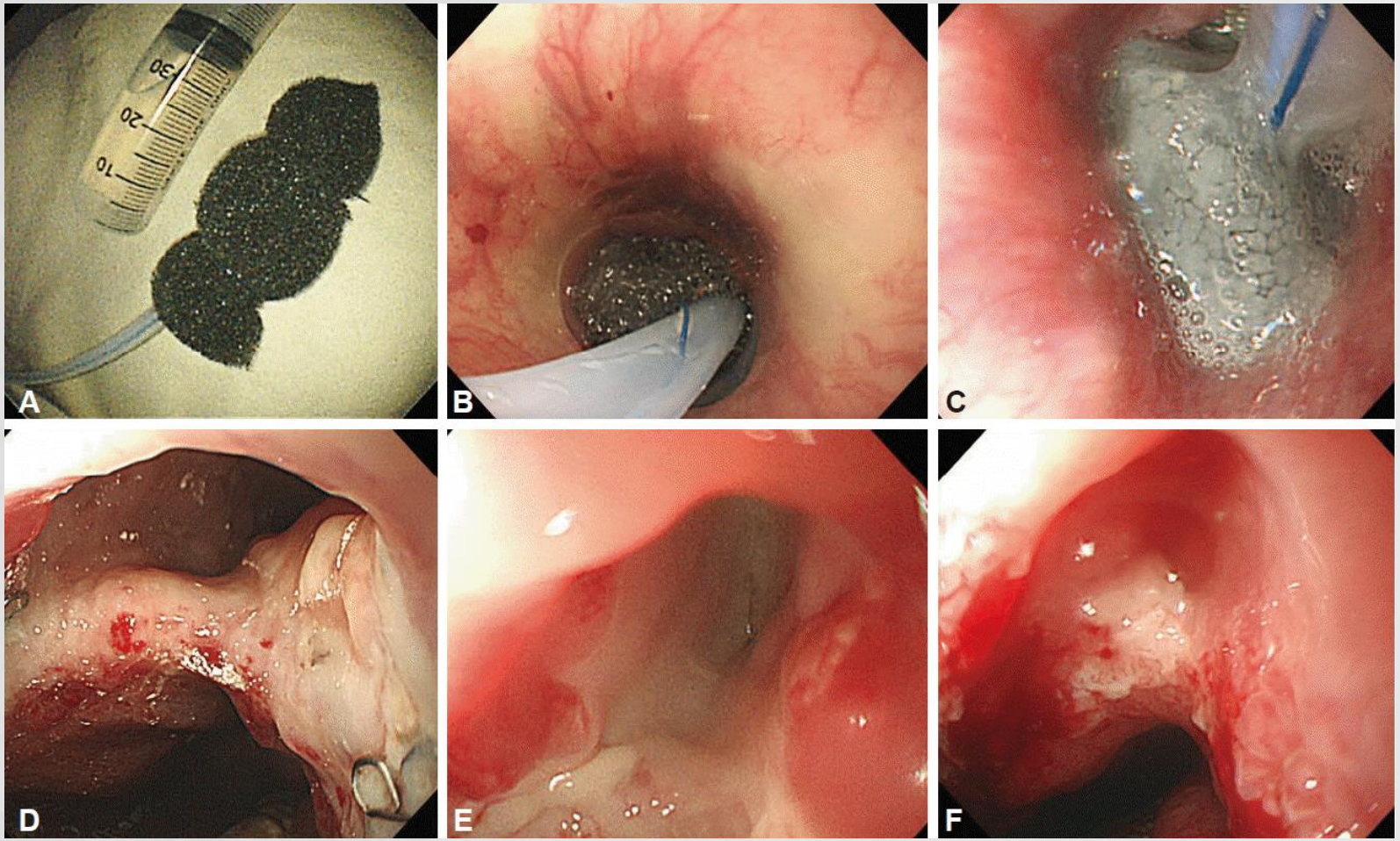
Methods. We performed a retrospective review of prospectively maintained databases of gastric and esophageal operations at our hospital between January 2003 and December 2012. Included patients had an operation for esophageal or gastric cancer, demonstrated evidence of an anastomotic leak at the esophageal anastomosis, and underwent attempted endoscopic therapy. Healing was defined as clinical and radiographic leak resolution.

Results. Forty-nine patients with leaks underwent endoscopic management. Of the 49 patients, 31 (63%) received cSEMS, 40 (82%) had dPEJ tubes inserted, and 3 (6%) received clips. Twenty-three (47%) patients underwent a combined approach. Overall, 88% of patients achieved healing in a median of 83 days. Twenty-two of 23 patients (96%) who underwent a multimodality endoscopic approach healed. Only 1 patient had a major complication associated with stent erosion into the pulmonary artery, which was successfully treated with operative repair.

Conclusions. Esophageal anastomotic leaks after esophageal and gastric cancer operations can be managed successfully and safely with endoscopic therapy. Combining cSEMS for leak control and dPEJ tube placement for nutritional support was highly effective in achieving healing, without the need for surgical repair.

(Ann Thorac Surg 2016;101:301–4)

Endoscopic Vaccum Therapy



Conduit ischemia

- 9% (minor ~ complete loss)
- Similar on gastric pull up and colon interposition(10.4 vs 7.4%)
- Early endoscopy
- Rapid deteriorating course with evidence of septic shock
- Surgical removal(gastrectomy) and esophageal diversion(gastostomy, adequate drainage, antibiotics, closure of hiatal defect)

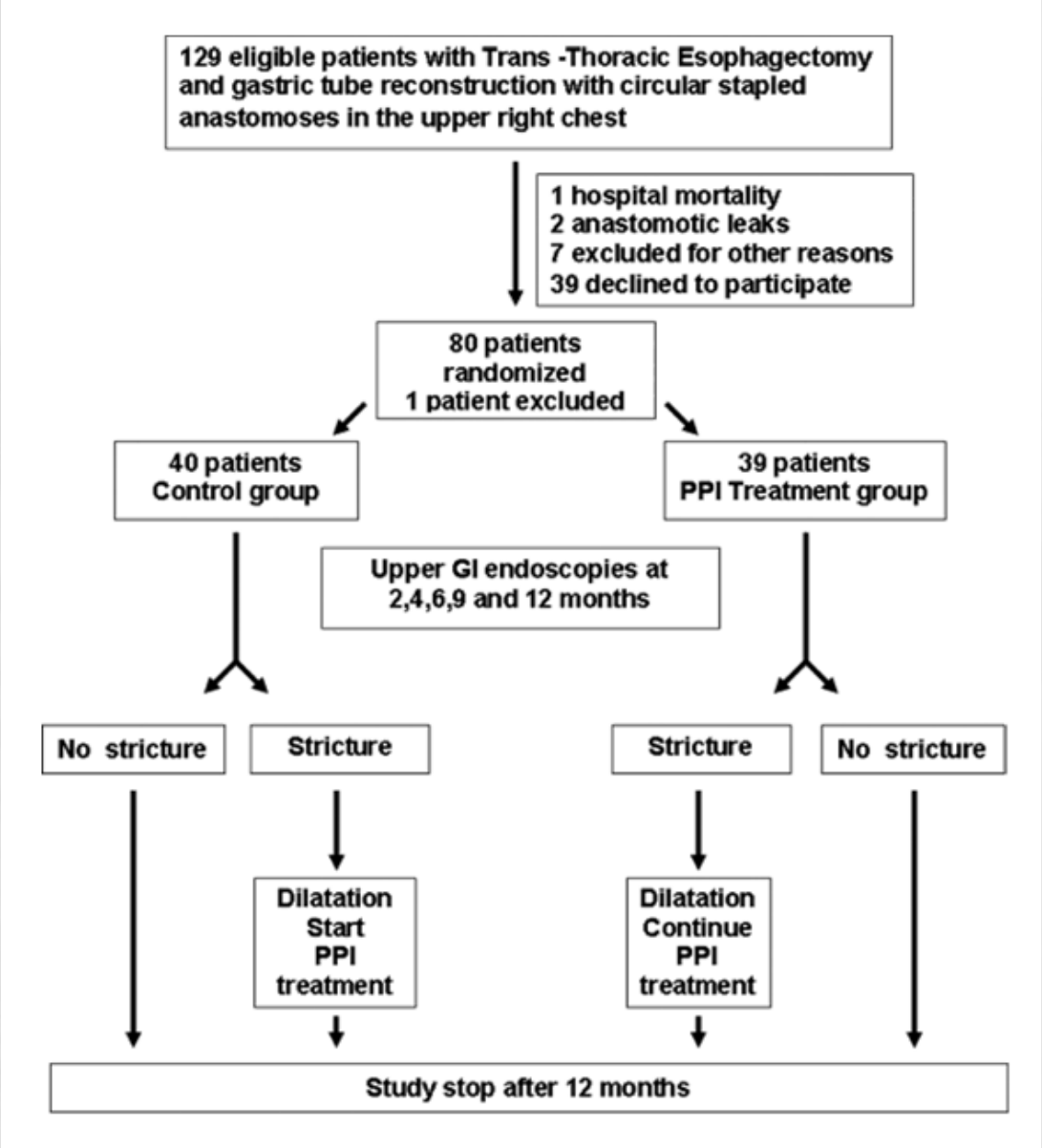
Anastomotic stricture

- 9-40%
- Conduit ischemia or recurrent disease
- Dysphagia, odynophagia, aspiration, inadequate dietary intake and malnutrition
- Conduit malperfusion/ischemia or surgical technique, anastomotic leak
- Gastric pull-up > colon
- Modified Collad or hybrid < hand sewn or circular stapler
- Tx: endoscopic dilatation

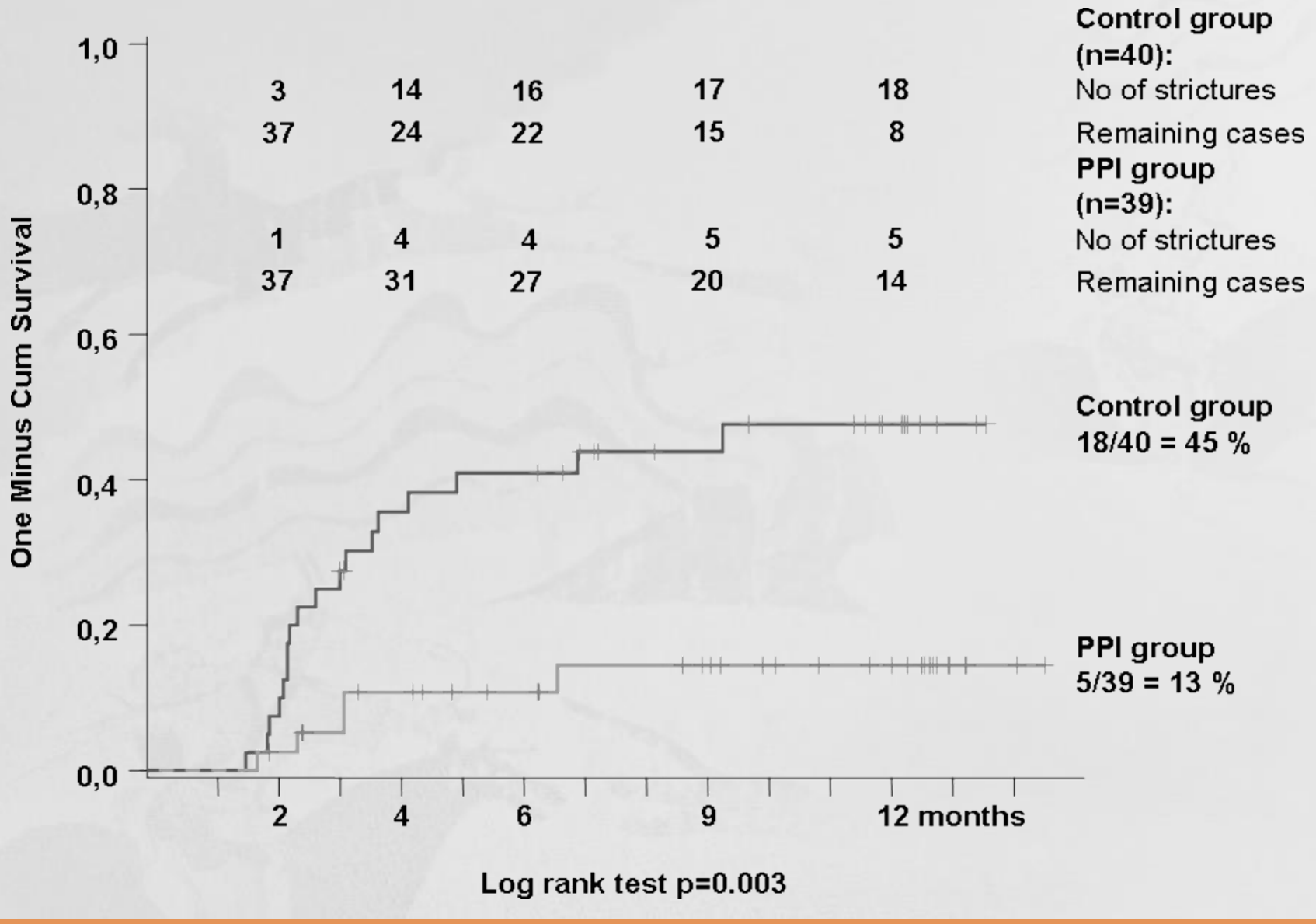
  local recurrence; surgery, CTx, RTx

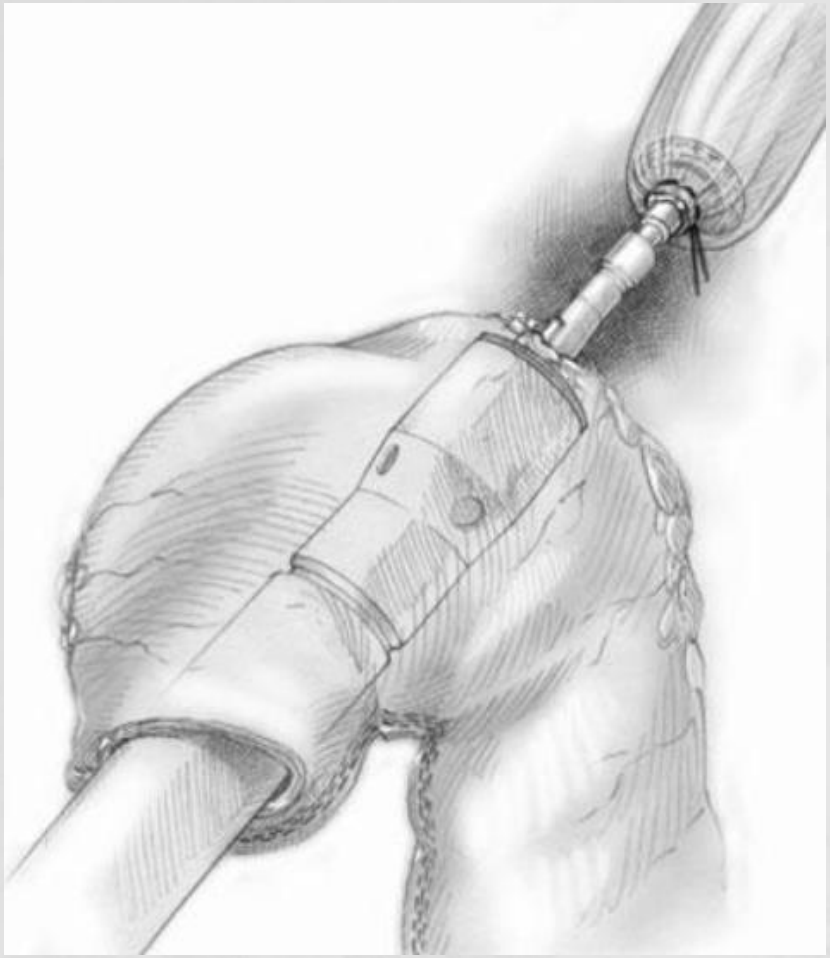
Incidence of Strictures

Orringer 2000	SMA	35%
	HSA (n>1000)	48%
Collard 1998	SMA (1/16)	6.7%
	HSA (10/24)	41.7%
Casson 2002	SMA	7.9%
	HSA	17%
Jo 2006	SMA (1/13)	7.7%
Singh 2001	SMA	19%
	HSA	58%
Ercan 2005	SMA	66%
	HSA	90%
Behzadi 2005	SMA	14.6%
	HSA	34%
Lerut	SMA	32.5%
	HSA	50.0%



Johansen et al. Ann Surg 2009. 250; 667-673


Control group
(n=40):
No of strictures
3 14 16 17 18
Remaining cases
37 24 22 15 8
PPI group
(n=39):
No of strictures
1 4 4 5 5
Remaining cases
37 31 27 20 14
One Minus Cum Survival
1,0
0,8
0,6
0,4
0,2
0,0
2 4 6 9 12 months
Control group
18/40 = 45 %
PPI group
5/39 = 13 %
Log rank test p=0.003



Recurrent Laryngeal Nerve injury

- Hoarseness, dyspnea, aspiration pneumonia
- Prompt laryngoscopy, swallowing evaluation
- Vocal cord injection
- 51Pt(41% recover for 1year, 4 recover in 2year)

Chylothorax

- 0-8% incidence(mortality upto 18%)
- Prophylactic ligation effect ?
- Elimination of enteral nutrition,TPN, octreotide, fluid supply
- >10mL/kg over 5 days

Postesophagectomy Chylothorax: Incidence, Risk Factors, and Outcomes

Rachit D. Shah, MD, James D. Luketich, MD, Matthew J. Schuchert, MD, Neil A. Christie, MD, Arjun Pennathur, MD, Rodney J. Landreneau, MD, and Katie S. Nason, MD, MPH

Department of Cardiothoracic Surgery, University of Pittsburgh, Pittsburgh, Pennsylvania

Background. Chylothorax is a rare but potentially lethal complication of esophagectomy. This study evaluated the rate of postesophagectomy chylothorax, identified associated risk factors, and compared postoperative outcomes in patients with and without chylothorax.

Methods. We reviewed 892 consecutive patients who underwent esophagectomy (1997 to 2008). Preoperative, operative, and postoperative details, including adverse outcomes and mortality, were analyzed.

Results. Postesophagectomy chylothorax occurred in 34 patients (3.8%). Chylothorax was significantly associated with 30-day major complications (85% vs 46%; $p < 0.001$), including an increased likelihood of sepsis ($p = 0.001$), pneumonia ($p = 0.009$), reintubation ($p = 0.002$) or reoperation ($p < 0.001$), and death (17.7% vs 3.9%, $p < 0.001$). Median length of stay was 17 vs 8 days ($p = 0.005$). Median time to chylothorax diagnosis was 5 days. Thoracic duct ligation was performed in 21 (62%) at a median 13 days after esophagectomy. Two patients required repeat duct ligation for persistent chylothorax. Squamous cell cancer histology (9 of 34; 26%) was an independent predictor of postoperative chylothorax (odds ratio, 4.18; 95% confidence interval, 1.39 to 12.6). Odds of chylothorax were 36 times greater with average daily chest tube output exceeding 400 mL in the first 6 postoperative days (odds ratio, 35.9; 95% confidence interval, 8.2 to 157.8).

Conclusions. Postoperative chylothorax is associated with significant postoperative morbidity and mortality. Patients with squamous cell cancer may be at increased risk. In addition, average daily chest tube output exceeding 400 mL in the early postoperative period should prompt fluid analysis for chylothorax to facilitate early diagnosis and consideration of thoracic duct ligation.

(Ann Thorac Surg 2012;93:897–904)

Dysphagia

- Mostly mostly anastomotic stricture, also functional
- 65%

Delayed gastric emptying

- 50%
- truncal vagotomy
- Gastric outlet procedure(pyloromyotomy, pyloroplasty) - Botox

Reflux

- Disruption, loss of normal antireflux mechanism (LES, angle of His, diap sling)
- Direct anastomosis with no sphincter like mechanism
- Positive intraabdominal/negative intrathoracic pressure
- Impaired conduit mortility
- Impaired esophageal remnant motility

Dumping syndrome

- 50%, vagotomy
- Early onset(10-30min): rapid transit hyperosmolar gastric contents into the small bowel
- Late onset(1-3Hr): hypoglycemia due to profound insulin response to CHO
- Tx: frequency↑, size↓of meal
- sugar reduction, fluid restriction, octreotide

Diaphragmatic hernia