Original Article

Anastomotic Leaks after Esophagectomy for Esophageal Cancer: A Comparison of Thoracic and Cervical Anastomoses

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Background and objectives: Esophagogastric anastomotic leaks remain a significant problem after esophagectomy for esophageal cancer. Many investigators have reported that leaks are more frequent after cervical, as opposed to thoracic, esophagogastric anastomoses. We conducted a retrospective review to assess the effect of anastomotic location (thoracic or cervical) on anastomotic leak incidence and severity.

Methods: Seventy-four consecutive patients with esophageal cancer underwent esophagectomy and esophagogastric anastomoses at our institution over a four-year period. Their charts were reviewed retrospectively and data was collected on age, gender, histology, stage, resection margin status, adjuvant therapy, cancer survival, anastomotic location, anastomotic leaks, and operative mortality.

Results: Cervical anastomoses were done in 19 patients and thoracic anastomoses were done in the other 55 patients. The two groups were similar with respect to age, gender, histology, stage, adjuvant therapy, and overall survival. Operative mortality for the entire group of 74 patients was 4% (3 patients). Resection margins were positive for residual tumor in 2 of 19 (11%) patients with cervical anastomoses and 9 of 55 (16%) patients with thoracic anastomoses (p=0.42). Leaks complicated 1 of 19 (5%) cervical and 9 of 55 (16%) thoracic esophagogastric anastomoses (p=0.21). Positive resection margins and anastomotic leaks were not significantly related (p=0.54). One of 9 (11%) leaks in the thoracic group proved fatal.

Conclusions: In our experience cervical esophagogastric anastomoses do not have a higher incidence of leaks than thoracic anastomoses. (Ann Thorac Cardiovasc Surg 2001; 7: 75–8)

Key words: esophagectomy, adverse effects; esophageal neoplasms; comparative study; anastomosis, surgical; surgical wound dehiscence

Introduction

Esophagogastric anastomotic leaks complicate 5-20% of esophagectomies for esophageal cancer, and they are responsible for approximately one-third of perioperative deaths after esophagectomy.[1-3] Cervical anastomoses reportedly have a higher leak rate than thoracic anastomoses, but leaks from thoracic anastomoses are more morbid.[1,2] The propensity of cervical anastomoses to leak is often cited as a reason to avoid total esophagectomy with cervical esophagogastric anastomosis.[1,4] We conducted a retrospective review to assess the effect of anastomotic location (thoracic or cervical) on anastomotic leak incidence and severity.

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Received September 4, 2000; accepted for publication February 1, 2001.

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Methods

Seventy-four consecutive patients with esophageal cancer underwent esophagectomy and esophagogastric anastomoses at our institution over a four-year period (1989-1993). Their charts were reviewed retrospectively and

data was collected on age, gender, histology, stage, resection margin status, adjuvant therapy, cancer survival, anastomotic location, anastomotic leaks, and operative mortality. Anastomotic leakage was defined as any clinical leakage of gastrointestinal contents through the wound or a drain, radiographic evidence of anastomotic or perianastomotic leakage of contrast (contained or noncontained), or postmortem finding of anastomotic dehiscence.

Both cervical and thoracic esophagogastric anastomoses were fashioned in two layers using a running inner layer suture and an interrupted outer layer.[4] Cervical anastomoses were done in conjunction with either a transhiatal (3 patients) or McKeown (laparotomy, right thoracotomy, and cervicotomy–16 patients) total esophagectomy. Thoracic anastomoses were done as part of a Lewis (laparotomy and right thoracotomy–25 patients) or left thoracoabdominal (30 patients) esophagectomy.

Data are presented as means ± standard deviations. Differences in means were assessed with Student's *t*-test (two-tailed). Nonparametric data were compared using chi-squared or Fisher's exact test. Survival analysis was done using the Kaplan-Meier model. A $p < 0.05$ was taken to be significant. All statistical analyses were performed using the SPSS statistical software (SPSS Inc. Chicago, IL, USA).

Results

Cervical anastomoses were done in 19 patients and thoracic anastomoses were done in the other 55 patients. The two groups were similar with respect to age, gender, histology, stage, adjuvant therapy, and overall survival (Table 1). Operative mortality for the entire group of 74 patients was 4% (3 patients).

Tumors located in the middle thoracic esophagus necessitated a high intrathoracic (right) or cervical anastomosis while tumors of the distal esophagus were reconstructed using a thoracic or cervical anastomosis. The preponderance of thoracic anastomoses in this series is therefore partially explained by the frequency of adenocarcinoma (51 of 74 patients), with its tendency for distal esophageal location, in contemporary Western esophageal cancer experience. Resection margins were positive for residual tumor in 2 of 19 (11%) patients with cervical anastomoses and 9 of 55 (16%) patients with thoracic anastomoses (p=0.42). Leaks complicated 1 of 19 (5%) cervical and 9 of 55 (16%) thoracic esophagogastric anastomoses (p=0.21). One of 11 (9%) patients with positive resection margins, and 9 of 63 (14%) patients with negative resection margins, developed an anastomotic leak (p=0.74). One of 9 (11%) leaks in the thoracic group proved fatal; the sole cervical anastomotic leak was not fatal (p=0.90) (Table 2).

Discussion

There are two stated advantages for cervical esophagogastric anastomoses after esophagectomy: leaks are less severe in the cervical location and the proximal resection margin is more generous (total esophagectomy) than with thoracic anastomoses.[1,2,4-8] Leaks that complicate a cervical esophagogastric anastomosis are usually simpler to manage, and less dangerous, than leaks occurring within the thorax.[1,5,8] Drainage can be established by opening the cervical incision at the bedside. The resulting fistula usually heals with conservative management.[1,8] Thoracic esophagogastric anastomotic leaks are generally more serious than cervical anastomotic leaks,[1] but most investigators have shown a lower incidence of leaks in the thoracic location.[5] The reported high incidence of cervical esophagogastric anastomotic leaks is often cited as a major disadvantage of the cervical anastomosis.[1,2,5-8]

There is no uniformly accepted explanation for the apparent high incidence of leaks with cervical esophagogastric anastomoses.[1] Possible explanations include tension, extrinsic compression, and the non-mesothelial environment of the neck.[1,6,9] Tension is unlikely to be a major factor since cervical esophagogastric anastomoses are often only 1-2 cm more proximal than high intrathoracic anastomoses. Gastric conduit compression by the bony confines of the thoracic inlet, with secondary vascular insufficiency, is probably more important than tension.[1,6] Finally, one animal experiment suggested that the mesothelial environment of the pleural and peritoneal cavities had a beneficial effect on anastomotic healing.[9]

Despite frequent reports that emphasize the propensity of cervical esophagogastric anastomoses to leak, not all surgeons have found this. Lam, in a comparative study, showed no difference in leak incidence for cervical and thoracic esophagogastric anastomoses.[10] Heitmiller reported a remarkably low incidence of cervical esophagogastric anastomotic leaks after total esophagectomy.[4] Our results confirm these findings.
The etiology of esophagogastric anastomotic leaks is multifactorial.[1,11] Surgical experience,[11,12] technique,[11,13]

Table 1. Comparison of thoracic and cervical esophagogastric anastomoses – general data

Variable	Cervical anastomosis (n = 19)	Thoracic anastomosis (n = 55)	p value
Age	61 ± 11	63 ± 9	p = 0.50
Female	2	9	p = 0.42
Location	Supracarinal: 5 Infracarainal: 14	Supracarinal: 9 Infracarinal: 46	p = 0.33
Histology	Squamous: 8 Adeno: 11	Squamous: 15 Adeno: 40	p = 0.15
Stage	I = 1 II = 11 III = 7	I = 3 II = 33 III = 19	p = 0.56
Radiotherapy	10	24	p = 0.49
Chemotherapy	6	20	p = 0.71
Specific operation	Transhiatal: 3 McKeown: 16	Lewis: 25 Left ThAb: 30	NA
Median survival (months)	13.9	13.5	p = 0.55

NA: not applicable
ThAb: thoracoabdominal

Table 2. Comparison of thoracic and cervical esophagogastric anastomoses - resection margins, leaks, and mortality

Variable	Cervical anastomosis (n = 19)	Thoracic anastomosis (n = 55)	p value
Positive resection margin	2	9	p = 0.42
Anastomotic leaks	1	9	p = 0.21
Mortality due to leak	0	1	p = 0.90
Operative mortality (all causes)	0	3	p = 0.40

and adequacy of gastric conduit vascularity[14] are all critical determinants of esophagogastric anastomotic wound healing. Surprisingly, malignant infiltration of anastomotic tissues is a questionable risk factor for esophagogastric anastomotic leakage. Some investigators have found positive resection margins to be causally related to anastomotic leaks,[7] but others have not.[11,15] Our results do not support the contention that malignant infiltration of anastomotic tissue is a predisposing factor for anastomotic leakage.

In our experience cervical esophagogastric anastomoses do not have a higher incidence of leaks than thoracic anastomoses. Anastomotic location is not a major determinant of anastomotic wound healing; experience, surgical technique, and gastric conduit vascularity are undoubtedly more important. Our incidence of leaks was not high enough to establish a relationship between leak location and physiological severity of leakage. Involvement of resection margins by tumor, although clearly undesirable, does not have a causal relationship with anastomotic leakage.

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