

*Objectives.* We have retrospectively evaluated the outcomes of both the cervical and the thoracic anastomoses in esophageal carcinomas in the early postoperative period.

*Methods.* We performed 75 esophagectomy operations in a group of 93 patients diagnosed as esophageal carcinoma between 1990 and 2002. We compared two patient groups (49 thoracic anastomoses, 26 cervical anastomoses) who underwent esophagectomy for esophageal carcinoma according to early complications especially emphasizing anastomotic leaks.

*Results.* Anastomotic leak was seen in 8 patients in the thoracic anastomosis group whereas in 6 patients in the cervical anastomosis group ( $p=0.0827$ ). The anastomotic leak ratios were 14% in stage II, 17% in stage III and 38% in stage IV ( $p<0.05$ ). No patient died during the operation. Eight patients (11%) died in the early postoperative period, all of them in the thoracic anastomoses group. According to the distance from the surgical resection margin, the anastomotic leak ratios were 22% in the  $<3\text{cm}$  group whereas in the  $\geq 3\text{cm}$  group 16% ( $p=0.9279$ ). The mortality rate was 100% in the thoracic anastomosis group, but in contrast no mortality was noted in cervical anastomosis group.

*Conclusions.* Total esophagectomy and cervical anastomosis is a safe surgical procedure. If anastomotic leaks occur in the thoracic anastomoses the mortality is very high whereas in cervical anastomoses leaks can be easily treated with rewarding results.

*Key words:* esophageal carcinoma, cervical anastomoses, thoracic anastomoses, outcome, early anastomotic leaks.

# Early anastomotic leaks after esophagectomy for cancer

## *Wczesne przecieki w obrębie anastomoz po usunięciu przetyku z powodu raka*

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### INTRODUCTION

With surgical procedures in patients with esophageal carcinoma it is important for patients as well as surgeons that the type of operation is appropriate and the morbidity and mortality are within acceptable levels. Cervical esophagogastric anastomoses (CA) have been gaining popularity in the recent years because complications in the thoracic anastomosis (TA) after esophagectomy have been high [1-6]. We have compared the patients in our clinic after subtotal esophagectomy and TA to total esophagectomy and CA especially with respect to anastomotic leaks and results of complications.

### MATERIALS AND METHODS

In the Thoracic Surgery Department of Ankara Numune Education and Research Hospital, we have reviewed 75 patients who were operated for carcinoma of the esophagus between 1990 and 2002. The average age of our patients was 53.5 years (ranging from 18 to 73), 21 patients were females (28%) and 54 of them were males (72%).

In all patients diagnosis of carcinoma and histologic classification were made using endoscopy prior to the operation. We had chest

roentgenograms, respiratory function tests, abdominal ultrasonography, and thoracic tomography and swallow passage studies before the operation in all our patients. In patients who had carcinoma located in the middle third of the esophagus in order to eliminate the possibility of tracheal invasion we performed bronchoscopy before the operation. **The kind of surgical procedure to be used and the anatomical approach in the surgical procedure were chosen according to the properties of the lesion, its location and the general physical condition of the patient.** In patients whose lesion was localized at the cardio esophageal junction and in distal 1/3 of the esophagus, TA was performed, whereas in the others, CA. All the surgical procedures were performed with the supervision of a team headed by the same surgeon. **Except for one patient, the stomach was used (98.6%) for replacement and the anastomoses were made using a monolayer 3-0 synthetic absorbable suture (vicryl) manually.**

Early complications were grouped under two headings: subtotal esophagectomy and TA patient complications and total esophagectomy and CA patient complications. Comparisons were made between these two groups. On the fourth post-

W analizie retrospektywnej analizowano powikłania związane z istnieniem szyjnych i piersiowych anastomoz w rakach przełyku we wczesnym okresie pooperacyjnym.

**Metoda.** W latach 1990–2002 spośród 93 chorych z rozpoznaniem rakiem przełyku u 75 wykonano zabieg usunięcia przełyku. W badaniach porównaliśmy dwie grupy chorych, u których przeprowadzono esofagektomię (49 anastomoz piersiowych oraz 26 anastomoz szyjnych) pod kątem wczesnych powikłań związanych z przeciekami w obrębie zespożeń.

**Wyniki.** Przecieki w obrębie anastomoz obserwowane były u 8 chorych z zespoleniami piersiowymi oraz u 6 chorych z zespoleniami szyjnymi ( $p=0,0827$ ). Nasilenie przecieków wynosiło 14 proc. w stopniu II, 17 proc. w stopniu III oraz 38 proc. w stopniu IV ( $p<0,05$ ). Nie obserwowano zgonów w trakcie przeprowadzenia zabiegów operacyjnych. Ośmiu chorych (11 proc.) zmarło we wczesnym okresie pooperacyjnym (u wszystkich wykonano anastomozy piersiowe). W zależności od odległości od marginesu chirurgicznego, przecieki w obrębie zespożeń wynosiły 22 proc. w grupie chorych z marginesem  $<3$  cm oraz 16 proc. w grupie  $\geq 3$  cm ( $p=0,9279$ ). W grupie chorych z anastomozami piersiowymi śmiertelność wynosiła 100 proc., natomiast w drugiej grupie nie zaobserwowano żadnych zgonów.

**Wnioski.** Całkowite usunięcie przełyku i wykonanie szyjnej anastomozy jest bezpieczną procedurą chirurgiczną. W przypadku pojawienia się przecieków w obrębie zespożenia piersiowego obserwuje się bardzo wysoką śmiertelność, podczas gdy w przypadku zespożeń szyjnych odpowiednio zastosowane leczenie może przynieść dobre rezultaty.

**Słowa kluczowe:** rak przełyku, anastomozy szyjne, anastomozy piersiowe, rezultaty kliniczne, wczesne przecieki w obrębie anastomoz.

**Table 1. The anastomotic locations according to the stages**

Stage	No. of patients No. (%)	CA No. (%)	TA No. (%)
I	–	–	–
II	21 (28)	4 (19)	17 (81)
III	46 (61)	20 (43)	26 (57)
IV	8 (11)	2 (25)	6 (75)
Total	75 (100)	26 (35)	49 (65)

**Table 2. Anastomotic leaks according to the resection margins**

Resection margin	Patient No. (%)	Anastomotic leak No. (%)
$\geq 3$ cm	44 (59)	7 (16)
$<3$ cm	31 (41)	7 (22)

operative day, all patients were examined for anastomotic leak by methylene blue given orally. If no leak was found and no problems arose, the drains were removed on the same day and the patients were discharged on the tenth postoperative day. **In patients who had anastomotic leak total parenteral nutrition (TPN) was administered. The chest tube was not removed in patients with TA for the purpose of follow-up.**

The Statistical Analysis Unpaired-t test and ANOVA (analysis of variance) were used as statistical methods ( $p<0.05$ ).

## RESULTS

In a total number of 93 patients we could perform operations on only 75 patients and the resectability rate was 81%. For 17 patients whose carcinomas were considered as unresectable, procedures such as gastrostomy and internal diversion, which were directed to support nutrition, were made or no procedures could be done for patients who did not accept such palliative procedures. **Additionally, these patients were excluded from the study.**

Most of malignancies were of the squamous cell type. In 62 patients (83%) we detected squamous type malignancy, in 11 patients (15%)

adenocarcinoma, in 1 (1%) patient small cell carcinoma and in 1 (1%) patient adenosquamous carcinoma was detected. When staging of the patients was done the biggest group was in stage III (62%). The CA was performed for 26 patients (35%) and TA for 49 (65%) (Table 1). Anastomotic leak was seen in 8 patients (16%) in the TA group whereas in 6 patients (23%) in the CA group ( $p=0.0827$ ). The anastomotic leak ratios were 14% in stage II, 17% in stage III and 38% in stage IV ( $p<0.05$ ). **According to the distance from the surgical resection border, the anastomotic leak ratios were 22% in the  $<3$ cm group whereas in the  $>3$ cm group 16% ( $p=0.9279$ ) (Table 2).** No patient died during the operation but 8 (11%) died in the early postoperative period all of whom were in the TA group (Table 3).

## DISCUSSION

Total thoracic esophagectomy and CA has been gaining popularity in the recent years because of its low mortality rates due to the complications [1-6]. In different papers CA leaks have been reported to be equal [7-9] or higher than [1, 4-6, 10] TA leak rates. In esophageal carcinomas anastomotic leak rates differ from 0% to 40% [1-7]. This rate is

closely related to the degree of traumatization of the tissues during surgery, the vascularization of the anastomotic region and also related to the degree of reduction of the tension of the anastomosis in the operation. Although in literature, the type of anastomosis, whether it is a single or double layer, or done manually or with stapling, the organ used in the anastomoses, the stage of the tumor, the distance from the anastomoses line to the tumoral tissue, additional radiotherapy or chemotherapy used in the treatment, the blood levels of hemoglobin and albumin have been all implicated in the etiology of anastomotic leaks [3-5, 7, 10-12]. It has been reported that the most important factors are vascularization, the gastric submucosal tissue oxygen tension and submucosal collateral circulation [3-5, 10, 13, 14].

**In our series, we determined a direct relation between the stage and the leak whereas no correlation was found when comparing it to the distance between the tumor and the anastomoses line. The great percentage of leak was especially determined in stage IV disease. This was probably due to the poor vascularity of the peritumoral region because of the advanced tumor and the need of extended surgical manipulation.**

There are big differences in mortality and recovery rates between CA and TA. Complete recovery rate is higher in CA leaks [2, 3, 7, 8] whereas the mortality in TA leaks is higher than 80% [1, 2]. In our series, the anastomotic leakage rate was higher in the CA group (23%) ( $p=0.0827$ ), but the main difference occurred in the mortality rates according to the site of the anastomosis (cervical or thoracic). The mortality rate was 100% (8/8) in the TA group, but in contrast no mortality was noted in the CA group (0/6).

In cases where anastomotic leaks were suspected we got the diagnosis using barium studies or other appropriate radio opaque

**Table 3. Anastomotic leaks**

Stage	CA leak No. (%)	TA leak No. (%)	Total No. (%)	Mortality No. (CA)	Mortality No. (TA)
I	–	–	–	–	–
II	2 (50)	1 (6)	3 (14)	–	1
III	3 (15)	5 (19)	8 (17)	–	5
IV	1 (50)	2 (33)	3 (38)	–	2
Total	6 (23)	8 (16)	14 (18)	–	8

materials that did not cause mediastinitis. We kept the thoracic drain or the cervical drain until the fourth postoperative day in all our patients. On the fourth day, we made the patient drank 250 ml of methylene blue and observed whether the colored liquids came from the drains. If not, we decided that there was no leak and removed the drains. We considered colored dye method an effective way to detect anastomotic leaks without the need of radiography using radio opaque media. Using this method we detected early anastomotic leaks in our patients.

When an anastomotic leak was found the most important point was to provide drainage to both TA and CA groups. In cases of CA leaks drainage should be totally obtained by removing skin and subcutaneous sutures. In cases of anastomotic leak esophagectomy is not recommended, but when high fever or deterioration in the general condition of the patient suggests gastric necrosis, a flexible endoscopy might be used to investigate the anastomotic site and assess the width of the leak [1, 2]. **In TA the region should be drained using a thoracic drainage tube and if complete drainage cannot be obtained, a surgical procedure might be needed in the early period [4, 5, 10].**

In all 14 patients in whom anastomotic leaks were observed, all leaks were noticed in the first four postoperative days before the removal of the drains. In all 8 patients with TA leaks the present thoracic drains were sufficient in obtaining

drainage and no additional surgical procedures were needed. But, despite all the medical support given to these patients their general conditions deteriorated and all of these patients died. In the CA group, the thoracic drains were removed because no colored liquids came from the drains although there was a leak from the cervical drains. Some of cervical sutures were removed to increase the effectiveness of the drainage and dressings were done regularly at 6-hour intervals. In two patients with cervical leaks, the leaks were excessive and it led us to endoscopy and because the gap was more than one third of the anastomosis length, a pectoral muscle flap was prepared as described by Heitmiller et al to close the anastomotic region [15]. This method was unsuccessful in both patients. In one patient the leak recurred seven days later and in the other patient twelve days later. We decided to treat these patients conservatively. They were given oral liquids containing antibiotics. These two patients recovered completely like the other four did. During medical support therapy for cervical leaks each patient was given an oral dose of 1000 ml saline + 5 ampules of antibiotics (rifamycin) mixture for the purpose of maintaining most effective drainage. The response to the therapy was good and the general condition of the patients improved. The dramatic difference in mortalities after cervical and thoracic leaks led us to believe that the CA method is safe especially in prevention against anastomotic leaks.

As a result, CA is a widely used and reliable method and it should be the **initial** preferred method because of its low mortality rates and ability to manage the complications more effectively. **Contrary to the fact that** the treatment in TA leaks is very difficult and mortality is higher than in CA leaks, **the simple measures** such as early drainage and frequent dressings lead to spontaneous healing of the leak and the life of the patient can thus be saved.

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