

# Emergent surgical treatment of radiation-induced enteropathies for patients with urogynecological and colorectal carcinomas

A. Parlakgumus<sup>1</sup>, K. Caliskan<sup>1</sup>, H. Ayse Parlakgumus<sup>2</sup>, F. Kayaselcuk<sup>3</sup>, A. Ezer<sup>1</sup>, T. Colakoglu<sup>1</sup>  
S. Belli<sup>1</sup>, S. Yildirim<sup>1</sup>

<sup>1</sup>Department of General Surgery, <sup>2</sup>Department of Obstetrics and Gynecology  
<sup>3</sup>Department of Pathology, Ankara (Turkey)

## Summary

**Aim:** The aim of this study is to describe our 10-year experience in patients with urogynecological and colorectal carcinomas with radiation enteropathy treated surgically as an emergency, and to reassess symptoms and mortality. **Patients and Methods:** The study included 17 patients receiving emergency surgery for complications of radiotherapy. Data about the patients and outcomes of the treatment alternatives used were retrospectively analyzed. **Results:** Of 17 patients, nine had colorectal cancer, six had gynecological cancer, and two had cancer of the urinary system. As an emergency, 12 patients had ileus only, one patient had intestinal fistulae and ileus, two patients had bleeding and ileus and two patients had perforation on admission. Seven patients underwent resection and anastomosis, two patients intestinal by-pass, four patients resection and ostomy and four patients bridectomy. Morbidity (75% for early complications and 100% for late complications) and mortality in the early postoperative period (25%) were higher in the patients undergoing bridectomy than in the patients undergoing other surgical methods. The rate of early and late complications (71.4% and 66.6%, respectively) was lower in the patients undergoing resection-anastomosis with a higher of quality life. Only 11 patients survived during a long follow-up period (64.7%). **Conclusion:** As the postoperative complication rate, overall and operative mortality of patients treated for radiation enteropathies as emergent surgery are high, specialists following this group of patients may favor removal of the pathologic tissue to avoid complications in the early and late postoperative period.

**Key words:** Urogynecological carcinoma; Colorectal carcinoma; Radiation enteritis; Surgery; Complication; Ileus.

## Introduction

Patients treated with irradiation of the abdomen or pelvis in the course of cancer treatment experience a severe problem, that is, radiation enteritis. It leads to a mortality rate of 0%-11% [1]. It has both an acute and chronic form and may have life threatening sequelae. Acute radiation enteropathy is usually a self-limiting disorder of intestinal functions. In fact, it causes reversible mucosal changes of the intestine and rarely requires surgical intervention. Chronic radiation enteritis is a progressive, disease process resulting in intestinal fibrosis and obliterative endarteritis. It may emerge months, years, or decades after treatment [2]. Chronic radiation enteritis leading to complications like stricture, perforation and fistula formation, is responsible for significant morbidity and mortality. Persisting obstruction, hemorrhage, intestinal perforation with peritonitis and with abscess and fistula formation require surgical intervention. In this report, we present our 10-year experience in patients with urogynecological and colorectal cancers with both acute and chronic radiation enteritis treated as an emergent surgery and reassess their symptoms, morbidity and mortality.

## Patients and Methods

We retrospectively evaluated data concerning all patients with complications from pelvic radiotherapy with urogynecological and colorectal cancers who required surgical management as an emergency at our General Surgery Department during a 10-year period between January 1999 and April 2009. Data on demographics, primary malignant disease, mean interval from radiotherapy (RT) to referral, number of attacks, albumin level, type of procedure, number of laparotomies, mean length of stay, hospital death and causes of death were obtained from patient records. Symptoms were graded in accordance with the Radiation Therapy Oncology Group (RTOG) guidelines [3] for both acute and chronic morbidities. Symptoms lasting for more than 30 days after radiotherapy were designated as "chronic radiation-induced enterocolitis". Diagnosis of radiation enteropathy was based on histological examinations (Figure 1) and intraoperative findings and decisions to operate on such patients were based on physical examination and abdominal X-rays, taken when the patients were erect, abdominal computerized tomography and clinical follow-up.

Surviving patients were invited for physical examinations to inform them about the quality of their life.

The method of surgery was left to the judgment of the surgeon and based on intraoperative findings.

Obtained data are expressed in mean values (standard error of the mean) unless otherwise indicated.

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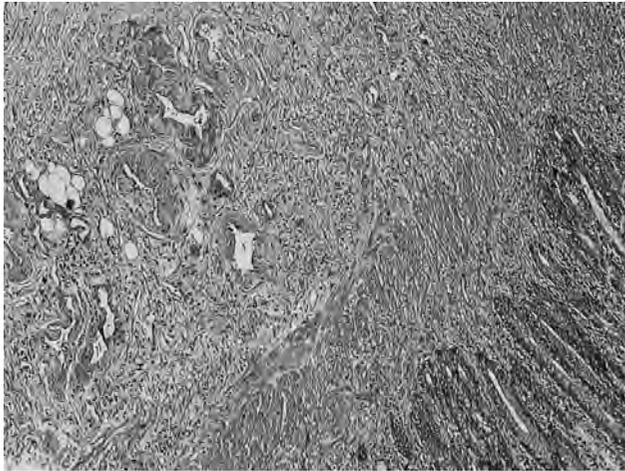


Figure 1. — Hyalinized blood vessels and the adjacent fibroblastic proliferation in submucosa of radiation colitis (H&E X 200).  
Figure 2. — Perforation following a radiation-induced strictured segment of ileum. The lumen is almost completely obliterated (white arrow).

## Results

The patients had a mean age of  $55.7 \pm 9.2$  years (range: 34-72 years), mean body mass index (BMI) of  $22.5 \pm 4.7$  and a mean albumin level of  $2.4 \pm 0.8$  g/dl. Of 17 patients, nine had colorectal cancer, six gynecological cancers (1 cervix and 5 endometrium carcinomas), two had urological (bladder) cancer and all received radiotherapy after their primary surgery. Nine patients (52.9%) had an accompanying disease. Five patients had diseases of the kidney (3 had obstructive uropathy, 1 had acute renal failure and 1 had chronic renal disease). Three patients had atherosclerotic heart disease and hypertension and one had diabetes mellitus and cerebrovascular disease. The time from radiotherapy to surgery was  $12.3 \pm 8.5$  months (1-34 months). The patients received medical treatment for ileus before surgery. The mean RTOG was  $3.4 \pm 0.4$  and two patients presented during the acute stage of their disease and 15 presented during the chronic stage of their disease. Twelve patients had ileus only, one patient had intestinal fistulae and ileus, two patients had bleeding and ileus, and two patients had perforation on admission. All the patients had pathology in their small bowels. Two patients found to have perforation underwent ostomy (Figure 2). One of these patients died of primary disease and the other patient survived during a long follow-up period.

Of all the patients with radiation enteritis, seven (41.2%) underwent bowel resection and concurrent enteroenterostomy, four (23.5%) had bowel resection and ostomy, four (23.5%) had bridectomy only and two (11.8%) had intestinal bypass (Table 1). The mean hospital stay was  $20.4 \pm 11.6$  days (3-43 days).

Thirteen patients undergoing surgery (76.5%) developed early complications. Out of three patients who died in the early postoperative period, 11 patients undergoing surgery (78.5%) had late postoperative complications.

Overall distribution of early and late postoperative com-

Table 1. — Distribution of surgical mortalities and early and late complications by the surgical method used for each patient.

Surgical method	Patient no. (%)	Early mortality no. (%)	Early complications no. (%)	Late complications no. (%)
Resection and anastomosis	7 (41.2)	1 (16.6)	5 (71.4)	4 (66.6)
Intraoperational by-pass	2 (11.8)	(-)	2 (100)	2 (100)
Resection and ostomy	4 (23.5)	1 (25)	3 (75)	2 (66.6)
Bridectomy	4 (23.5)	1 (25)	3 (75)	3 (100)

plications by the surgical methods used are given in Tables 2 and 3. Patients undergoing resection-anastomosis and patients undergoing by-pass had a lower mortality in the early postoperative period (16.6% and 0%, respectively) and patients undergoing resection-anastomosis and those undergoing resection/ostomy had fewer early and late complications (71.4% and 75% for early and 66.6% and 66.6% for late complications, respectively, Table 1).

All three patients (17.6%) died in the early postoperative period (within two months of surgery). Two patients died of primary oncological disease in the long-term follow-up period. Another patient with an enterocutaneous fistula treated with intestinal resection and anastomosis died of internal disease and neurological problems in the long-term follow-up period.

The mean follow-up period was  $47.9 \pm 29.1$  months in 11 patients surviving during the long-term follow-up period and all presented to hospital for their follow-up examinations. None of these patients had a recurrence of the previous neoplasm or metastasis. No reoperation was mandatory because of recurrence of symptoms as an emergency for the long-term survivors.

Five patients undergoing resection and anastomosis were able to go for a walk every day. Two patients com-

Table 2. — Overall distribution of early postoperative complications by the surgical method used.

Complications	Resection and anastomosis	Intraoperative by-pass	Bridectomy	Resection and ostomy
Wound infection	4	2	2	2
Deep surgical site infection	2	—	1	—
Wound dehiscence	2	—	1	2
Sepsis	1	—	—	2
Enterocutaneous fistula	1	—	2	—
Ileus	—	—	—	1

Table 3. — Overall distribution of late postoperative complications by the surgical method used.

Complications	Resection and anastomosis	Intraoperative by-pass	Bridectomy	Resection and ostomy
Incisional hernia	1	—	1	—
Enterocutaneous fistula	1	—	—	—
Malnutrition	1	2	1	2
Diarrhea	2	1	1	1
Ileus	1	1	—	1

mented that they had a better quality of life after surgery. However, three patients had serious diarrhea and noted that their quality of life had worsened. Two patients undergoing by-pass and surviving during the long-term follow-up period noted that the quality of their life was worse due to severe diarrhea and weight loss and another two patients undergoing resection and ostomy commented that the quality of their life worsened due to the ostomy bag and diarrhea attacks. Of the two patients undergoing bridectomy, one had a lower quality of life due to side-effects of radiation enteritis and the other patient also had a lower quality of life due to an enterocutaneous fistula, incisional hernia, repeated surgical operations and percutaneous drainage for an intraabdominal abscess.

## Discussion

Radiation depletes actively proliferating cells in the intestine in the acute stage and causes obliterative vasculitis in the long-term. When these effects are prolonged, abscess/fistula and stricture may appear [4]. The higher the number of indications for radiotherapy in abdominopelvic malignancy is [5], the higher the possibility of an increased incidence of radiation enteritis is. The higher rate of morbidity and mortality may be due to patients that have primary cancer, a longer bowel segment affected by radiotherapy and difficulties in wound healing.

Parenteral nutrition does not help to close radiation-induced fistulae [6] and surgical strategies are necessary to treat complications of radiation enteritis. Among them is the use of proximal stomas, intestinal bypass and resection with reanastomosis – employing the usually radiation-spared ascending, transverse and descending colon [7].

Surgery may help to eliminate radiation enteropathy in some cases. However, surgical interventions pose a high risk of complications caused by frequent widespread enteropathy, poor healing, and nutritional derangement. Frequently encountered complications are anastomotic dehiscence and fistula formation. Affected intestines should be resected adequately whenever appropriate [8-10]. These patients have a longer hospital stay since they require a longer medical supervision and experience complications more frequently. The mean hospital stay in the present series was  $20.4 \pm 11.6$  days (4-43 days).

In the literature, the other series comparing operative techniques for radiation enteritis are also small and most are lacking statistical power. Regimbeau *et al.* compared a resection group (with or without anastomosis) with a conservative treatment group (by-pass, adhesiolysis and diverting ileostomy). However the authors could not find a statistically significant difference between the two groups for mortality and overall survival. Despite this statistical incoherence, the overall 5-year survival rate was 71% after resection treatment and 51% after conservative treatment, and they believed that the irradiated bowel should be resected during the first operation. We found that the patients undergoing resection-anastomosis and the patients undergoing by-pass had a lower mortality in the early postoperative period and the patients undergoing resection/anastomosis and those undergoing resection/ostomy had fewer early and late complications. In addition, the patients undergoing resection-anastomosis had the highest quality of life. Out of 11 surviving patients, only two commented that the quality of their life had become better and they had had resection and anastomosis.

By-pass surgery and bridectomy avoid neither pathologic tissue nor the risk of perforation, obstruction, abscess formation, bleeding, and bacterial translocation in a blind loop. Shiraishi *et al.* indicated that survival was significantly longer in a resection group than in a decompression group. Patients treated with decompression procedures alone had an 11 times higher risk for death than those treated with addition of intestinal resection [11].

In the present series, procedures such as resection-ostomy and by-pass may be life-saving but causing a worse quality of life because of their side-effects on the operated patients like ostomy bag, diarrhea attacks and weight loss. More importantly, patients undergoing bridectomy had higher morbidity and mortality than patients undergoing other surgical methods.

Our series is superior and different from others as we inspected only emergent surgical interventions for radiation enteritis. In this way, we had the opportunity to compare our results in a homogenous population. However all the other studies compared the parameters in non-homogenous populations and compared the types of procedures in both planned and emergency conditions together. One other important difference was our long-term follow-up of survivors' quality of life.

Regimbeau *et al.* indicated that their population was operated as an emergency in 25% and compared emergency procedures with planned ones. They observed that

the operative mortality was significantly higher when the procedure was performed as an emergency (11% vs 1%) [8]. Our operative mortality was 17.6% (3/17). Based on ours and other studies, in order to prevent morbidity and mortality specialists following these patients must canalize the cases to propose surgery earlier in the course of events.

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Address reprint requests to:  
H. AYSE PARLAKGUMUS  
Başkent Üniversitesi Seyhan  
Araştırma ve Uygulama Hastanesi  
Barajyolu 1. Durak 01110 Seyhan  
Adana (Türkiye)  
e-mail: ayseparlakgumus@yahoo.de