

Irradiation and Surgery for Primarily Inoperable Rectal Adenocarcinoma*

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Bjerkset T, Dahl O. Irradiation and surgery for primarily inoperable rectal adenocarcinoma. *Dis Colon Rectum* 1980;23:298-303. Preoperative irradiation followed by radical surgical removal of the tumor should be attempted in all patients with locally advanced rectal adenocarcinomas, including patients with moderate distant metastases. If the tumor is not operable after half dose of irradiation (3150 rads), the patients should be re-explored for resectability after full irradiation dose. Resectability can only be adequately determined by exploratory laparotomy and an attempt to resect the tumor-bearing segment by anatomic dissection, and not solely by rectal exploration or palpation of the pelvis at laparotomy. [Key words: Adenocarcinoma, rectal; Irradiation, preoperative; Rectum, adenocarcinoma]

IN SPITE OF THE EARLY SYMPTOMS from rectal adenocarcinomas and the fact that the greater part of the tumors can be reached by digital rectal examination, about 10 per cent of all rectal carcinomas are inoperable when first diagnosed.^{1,2} Only half of these patients with locally advanced tumors have distant metastases. Untreated, or with a diverting colostomy as the only palliative treatment, these patients survive an average of only five to six months from the time of established diagnosis, or eight to 22 months from the onset of the symptoms.^{3,4}

"There is hardly a more miserable man alive than one with an advanced cancer of the rectum," Daland *et al.* stated in 1936.³ The symptoms such as unbearable burning pain, ulcerating tumors with massive hemorrhage, involvement of neighboring organs with hematuria, painful bladder contractions and ureteral obstruction, lymphoedematous distention of the lower extremities together with anal incontinence and foul-smelling discharge, all constitute a heavy burden for the patient and his relatives. These patients are still a challenge to the medical profession.

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We will herein present our results after irradiation of 27 rectal adenocarcinomas initially considered inoperable. Exploratory laparotomy was performed in 22 cases and resection of the tumor in 16 of these.

Materials and Methods

Patient Selection: Among 130 consecutive patients admitted to the Department of Surgery from April 1976 to July 1979 for rectal adenocarcinomas, 30 patients had locally inoperable tumors. This comprises one-fourth of all rectal carcinomas seen during the period. Three patients with massive distant metastases and high age were excluded as they were considered beyond treatment. Twenty-seven patients, 14 women and 13 men, were included in the study. The average age was 66.6 years (range 44-87 years), and symptoms had been present for seven months (range 3-24 months).

The rectum was defined as the distal 15 cm of the large bowel measured from the anal verge during rectoscopy. The tumors were localized in the distal part of the rectum in seven patients, the remaining were equally distributed to the middle and upper third of the rectum.

Pretreatment investigations included physical examination with bimanual palpation of the rectum and pelvis, rectoscopy with biopsy, urethracystoscopy, x-ray of the chest and colon, excretory urography, liver isotope scintigraphy, serum carcinoembryonic antigen (CEA), and routine biochemical blood tests including liver function tests.

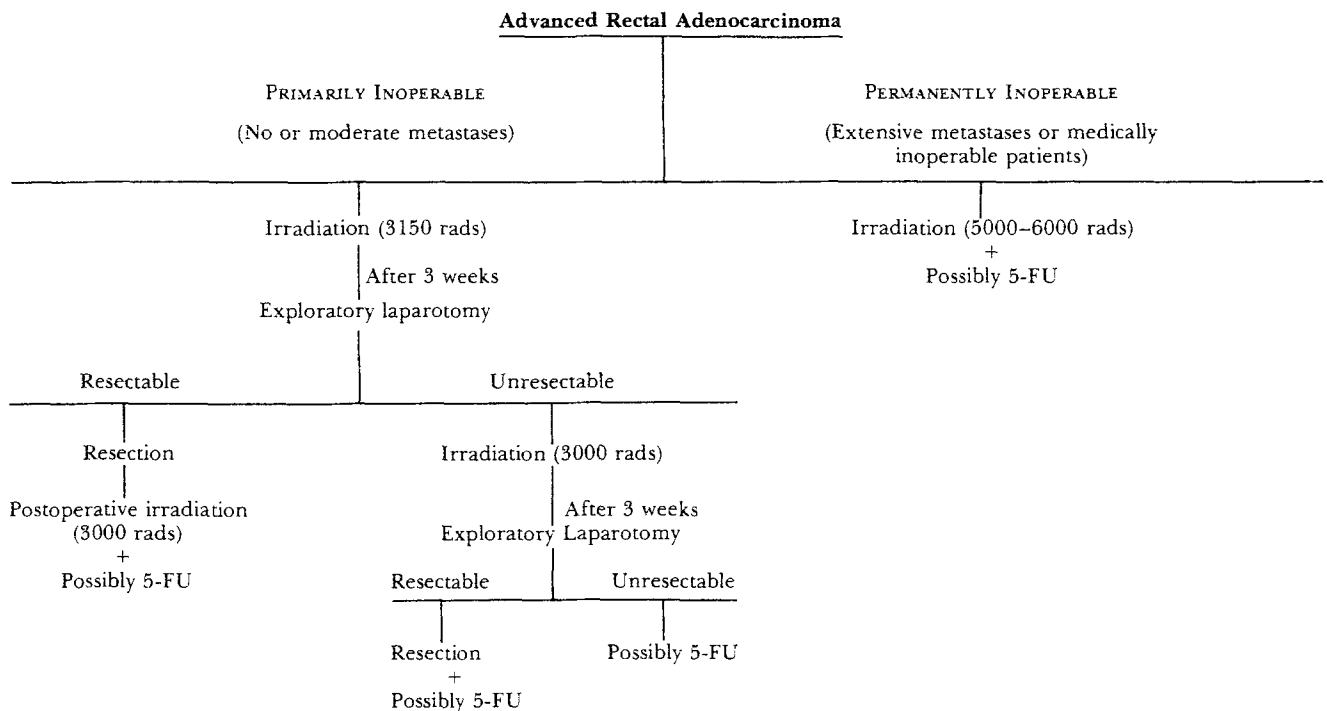


FIG. 1. Treatment schedule for primarily and permanently inoperable adenocarcinomas of the rectum. 5-FU= 5-fluorouracil.

The criteria for inoperability were tumors fixed to the pelvic wall, ureteral obstruction, or tumor growth into the bladder or other surrounding organs, verified by biopsy. Three patients were considered medically inoperable.

Our current treatment policy for primarily inoperable rectal adenocarcinoma is shown in Figure 1.

Irradiation: The treatment volume included the entire minor pelvis and the para-aortic lymph nodes up to the vertebra L1 (Chimney field).⁵ All treatments were given by a cobalt-60 source. The dose was 3150 rads fractionated with 1750 rads daily over 24 days, as proposed by Kligerman,⁵ as the preoperative dose for operable rectal carcinoma. The purpose of the irradiation was to make the tumor technically operable by shrinkage and to reduce the viability of cancer cells at the time of operation. All patients were re-examined for operability of the tumor 2½ to 3½ weeks after cessation of irradiation by physical examination, rectoscopy and exploratory laparotomy. As soon as possible after tumor resection the patients received an additional dose of 2000 to 3000 rads to the same field and with the same daily doses. Those still inoperable received the same dose at once followed by renewed examination for operability after full dose. Patients with distant metastases had additional therapy with 5-fluorouracil when indicated.

Survival is calculated from the last day of irradiation or the date of laparotomy for those patients operated upon.

Results

The first course of irradiation was well tolerated with no major complications. Mild diarrhea and food intolerance were noted in a few cases. Most of the patients with symptoms of bowel obstruction reported improvement. Shrinkage of the tumor mass, as judged by rectal exploration and rectoscopy, was noted in most of the patients, and patients without extensive metastases reported an improved well-being and general physical condition.

Five patients were re-examined for operability after irradiation by rectal exploration only, among them were the three medically inoperable patients. One of them was considered technically operable and this was later confirmed by autopsy, as the fixation to the sacrum was caused by fibrosis only.

Exploratory laparotomy was performed after irradiation in 22 patients (12 women and 10 men). Sixteen patients (12 women and 4 men) were technically operable and an abdominoperineal proctectomy or a low anterior resection could be performed.

TABLE 1. Results of Pre- and Postoperative Irradiation in 16 Patients with Primarily Inoperable Rectal Adenocarcinoma

Patient	Sex	Age (years)	Duration of Symptoms (months)	Surgical Procedure	Distant Metastases at Operation		Postoperative Therapy	Status
					Operation	Operation		
Patient 1	F	70	6	Low anterior resection + bladder resection	None	None	3000 rads	NED, 41 months
Patient 2	F	44	6	Low anterior resection	None	None	3150 rads + 5-FU	NED, 30 months
Patient 3	F*	78	5	Rectal amputation	None	None	None	NED, 18 months
Patient 4	F	71	5	Rectal amputation	None	No rectal tumor	1930 rads	NED, 13 months
Patient 5	F	68	?	Rectal amputation	None	None	None	Dead postoperatively; no tumor
Patient 6	M	72	24	Rectal amputation	None	None	2440 rads	Dead 4 months, disseminated disease
Patient 7	M	68	4	Rectal amputation	None	None	2450 rads	Dead of liver metastases, 11 months
Patient 8	M	48	5	Rectal amputation	None	None	1850 rads	NED, 6 months
Patient 9	F	87	?	Rectal amputation	None	None	None†	NED, 5 months
Patient 10	F	74	6	Rectal amputation	None	None	1850 rads	NED, 4 months
Patient 11	F	62	5	Rectal amputation	None	None	3180 rads	Alive; liver hilar metastases, 29 months, 5-FU therapy
Patient 12	F	67	3	Rectal amputation + vaginal resection + extirpation of uterus and adnexae	Liver (ext)	Liver (ext)	None‡ + 5-FU	Dead, 12 months, liver metastases; no local recurrence
Patient 13	F	71	5	Rectal amputation (not radical)	Liver (ext)	Liver (ext)	3000 rads + 5-FU	Dead, 7 months; local recurrence
Patient 14	F	60	9	Rectal amputation + vaginal resection	Liver (mod)	Liver (mod)	None‡ + 5-FU	Dead, 18 months, liver and lung metastases; no local recurrence
Patient 15	F*	61	18	Low anterior resection	Liver, lung	Liver, lung	None + 5-FU	Dead, 11 months, of metastases
Patient 16	M	80	3	Rectal amputation	Liver (mod)	Liver (mod)	None† (Liver metastases)	Alive, 12 months

* = operable first after full dose of irradiation (6000 rads)

† = not given due to advanced age

‡ = not given due to postoperative perirectal fistula

NED = no evidence of disease

ext = extensive

mod = moderate

TABLE 2. Results of Treatment with Split Course of Irradiation (3150 + 2400 [range 1900 to 3150] rads) in 11 Patients with Inoperable Rectal Adenocarcinoma

	Sex	Age (years)	Duration of Symptoms (months)	Surgical Procedure	Distant Metastases at Treatment	Palliation	Status
Patient 1	M	58	5	Exploratory laparotomy* +colostomy	None	Poor	Dead, 6 months, local disease
Patient 2	M	67	4	None	None	Good	Dead, 17 months, local disease
Patient 3	M	60	6	Exploratory laparotomy +colostomy	None	Good	Dead, 8 months, other disease; no residual tumor
Patient 4	M	64	4	None	None	Good	Dead, 13 months; no section
Patient 5	M	59	3	Exploratory laparotomy +colostomy	None	Good	Dead, 11 months, myocardial infarction; no section
Patient 6	M	52	8	Exploratory laparotomy +colostomy	None	Poor	Dead, 6 months, massive metastases (perirectal fibrosis)
Patient 7	M	59	3	Exploratory laparotomy +colostomy	Liver (nmd)	Good	Dead, 11 months; no section
Patient 8	M	79	12	Exploratory laparotomy +colostomy	Liver (ext)	Good	Alive, 10 months
Patient 9	M	73	6	Colostomy Medically inoperable†	Liver, lung (ext)	—	Dead, postoperatively, pulmonary embolism
Patient 10	F	86	4	None Medically inoperable	None	—	Dead, 2 months, metastases to lungs, liver, peritoneum
Patient 11	F	82	10	None Medically inoperable	None	—	Dead, 2 months, no metastases; tumor fixed by fibrosis only

* Exploratory laparotomy performed, in six, to evaluate resectability three weeks after first course of irradiation.
 † Medically inoperable patients had only first irradiation dose due to postoperative embolism or rapidly growing metastases.
 mod = moderate
 ext = extensive

Six of the ten men were judged still inoperable at laparotomy but, in retrospect, three of these were most probably operable according to the operating report in one and the autopsy findings of fibrosis without tumor tissue in two cases.

All of the women who underwent exploratory laparotomy were operable, two of them first after the second course of irradiation. None of the men were re-examined for resectability by a second exploratory laparotomy after the full dose of irradiation.

Fifteen of the 16 patients with resectable tumors were considered radically operated locally, as confirmed by microscopy. In one patient residual tumor tissue was present in the pelvis both macroscopically and microscopically. In two patients no malignant tissue could be found at all by microscopy of the resected specimen.

Seven of 11 resected patients without distant metastases at the time of operation are still alive with no sign of disease, 4 to 41 months after operation, an average of 16 months. One patient who developed liver hilar metastases is alive 29 months after operation. One patient died postoperatively due to a surgical complication with massive hemorrhage and kidney failure. No metastases or residual tumor was found in the pelvis at autopsy. One patient died of liver metastases 11 months after operation, and one patient died of disseminated disease 4 months after operation. Only one of the patients with liver metastases at operation is alive 12 months postoperatively. The remaining four patients died of their metastases 7–18 months after operation, an average of 12 months. The only recurrence was seen in the patient who was locally not radically operated upon (Table 1).

Eleven of the 27 patients were considered permanently inoperable but, retrospectively, four of the tumors might have been resected. Of the medically inoperable patients, one died of pulmonary embolism after a colostomy for bowel obstruction. The two others died two months after the first course of irradiation, one with massive cancer spread to the lungs, liver, and peritoneum, the other with a localized tumor fixed by fibrosis only and no metastases. Two of the eight technically inoperable patients had metastases. One is alive after 10 months, the other died of distant metastases after 11 months. The remaining six patients had no distant metastases at operation. One patient died after eight months due to suppurative nephritis; autopsy revealed no ureteral obstruction, no metastases, and no residual tumor tissue. One patient died of myocardial infarction after 11 months; an autopsy was not performed. All the other patients died of cancer; one with massive metastases, the rest with local disease without metas-

tases 6–17 months, an average of 12 months, after irradiation. Six of the nine permanently inoperable patients (excluding the medically inoperable ones) had good palliative effects from irradiation, two had only brief palliation of pain (Table 2).

Discussion

Palliative removal of the primary growth can offer patients with colorectal cancer considerable subjective relief^{6,7} and the survival is significantly increased in patients with moderate distant metastases.^{4,8,9} Some patients with metastases can be cured by secondary surgery directed against the metastases. Reductive tumor surgery to lessen the "tumor burden" may make the patient's own immune system more competent to deal with the secondaries and also offer the cytostatic agents better possibilities to act.¹⁰

Adenocarcinomas of the rectum and colon regress after irradiation¹¹ as shown by a five-year survival of 5–11 per cent by irradiation alone.^{12–14} Local palliation is achieved in up to 80 per cent of patients, with absence of symptoms lasting from months to years.^{12–14} It may therefore be worthwhile to offer irradiation as palliation against unbearable pain and discharge even to patients with massive distant metastases, or peritoneal carcinomatosis if the general condition of the patient is reasonably good.

Primarily inoperable adenocarcinomas of the rectum can be converted to a technically operable stage in half of the cases with a fairly good five-year survival rate.^{5,12,15–17} In our study, 16 of 24 primarily inoperable patients became technically operable after irradiation.

According to Moossa *et al.*,¹⁸ distal tumors, infiltration of the perirectal tissue, involvement of the lymph nodes, and age less than 60 years all increase the risk of local recurrence. The resectability is reported to be independent of the degree of malignancy, the mass of the tumor, or the degree of fixation judged by rectal examination only. Rigid fixed masses may be caused by fibrosis, and it is stressed that exploratory laparotomy is necessary to determine the operability after irradiation.^{12,16}

Our experience and findings support these statements. We believe that resectability can be determined only by exploratory laparotomy and serious attempts to remove the tumor bearing segment by anatomic dissection, and not solely by digital palpation of the pelvis during operation. This fact may, to a certain degree, explain the difference in our study between men and women as far as resectability is concerned. An exploratory laparotomy and attempt to remove the tumor radically was performed on all

women who were medically operable. This succeeded in all cases despite the impression of inoperability as judged by digital palpation of the pelvis alone. One patient was judged inoperable by palpation during laparotomy. However, the tumor was easily resected by another surgeon by relaparotomy and anatomic dissection of the tumor-bearing segment. Histologically there was no tumor tissue left, only fibrosis and lakes of mucin. Two men were found inoperable by rectal exploration only, the rest by exploratory laparotomy and palpation of the pelvis. Retrospectively, three of these patients were probably operable. At autopsy two of them had no tumor left, only perirectal fibrosis.

According to Allen and others,^{7,15} prophylactic colostomy should not be performed prior to irradiation, since survival of patients with colostomy was significantly decreased. If colostomy had to be performed because of high-grade stenosis or threatening or actual perforation, it should be placed outside the irradiation field as a transversostomy to the right of the midline. The greater part of colostomies in our patients were performed prophylactically during exploratory laparotomy.

The number of locally inoperable tumors in our study is high since it comprises approximately 20 per cent of all rectal carcinomas seen during the period. The reason is probably the fact that patients with advanced rectal carcinomas are referred to us from other hospitals, such as University Hospital.

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