Endocavitary Irradiation

An Option in Select Patients with Rectal Cancer

Tracy L. Hull, M.D.,* Ian C. Lavery, M.D.,* Jerrold P. Saxton, M.D.†

*From the Departments of *Colorectal Surgery and †Therapeutic Radiology, The Cleveland Clinic Foundation, Cleveland, Ohio*

PURPOSE: Endocavitary irradiation delivers high-dose irradiation with limited penetration and is an established modality for the curative treatment of select tumors. The purpose of this study was to review the experience from our institution with endocavitary irradiation. METHODS: All patients with rectal cancer treated with endocavitary irradiation between 1973 and 1992 were studied. Collected data included: tumor size, tumor differentiation, distance from the anal verge, mean follow-up, recurrence, and other treatments used. RESULTS: One hundred ninety-nine patients received endocavitary irradiation, with 126 treated with curative intent. No significant differences were found between groups with recurrence and no recurrence when examining tumor size, differentiation, distance from the anal verge, or follow-up. With a mean time to recurrence of 16.1 (range, 1-56) months, 37/126 patients had a recurrence, and 89/126 had no recurrence. Ten recurrences were distant, and all patients died of the disease. Twenty-seven patients had local recurrence. Following additional treatments, 14 additional patients were rendered free of disease. CONCLUSION: Endocavitary irradiation initially rendered 71 percent (89/126) free of disease. With additional treatment 11 percent (14/126) were rendered free of disease. In the subgroup of patients followed more than five years, 68 percent had no evidence of disease at follow-up after endocavitary irradiation, and 91 percent had no evidence of disease with additional treatment. Tumor size, differentiation, morphology, and distance from the anal verge did not influence recurrence. Debulking or surgical excision before endocavitary irradiation did not increase recurrence. Diligent long-term follow-up and a liberal policy to biopsy suspicious areas may increase the salvage rate. [Key words: Rectal cancer; Endocavitary irradiation; Direct contact radiotherapy]

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Endocavitary irradiation (ER) delivers a high dose of radiation with limited penetration directly to rectal lesions. This treatment was popularized by Papillon in 1974.[1] Since that time this modality has been used to treat adenocarcinoma of the rectum for cure or palliation.

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Address reprint requests to Dr. Hull: Department of Colorectal Surgery, A111, The Cleveland Clinic Foundation, 9500 Euclid Avenue, Cleveland, Ohio 44195.

When treating for cure, suitable tumors are those that are superficial (*i.e.*, not tethered), have no palpable lymph nodes, measure less than 5 cm (preferably less than 3 cm), and are within the reach of the ER unit. In the past, abdominoperineal resection or anterior proctosigmoidectomy with anastomosis was the advocated treatment for rectal cancer. As less radical treatments have been advocated, they must have comparable outcomes to traditional treatment. The purpose of this study was to review the experience from our institution with all patients treated by endocavitary irradiation with a curative intent.

MATERIALS AND METHODS

A standard data sheet was used to review all patients treated with ER from November 1973 to October 1992. Even though 199 patients were treated, only 126 were treated with curative intent and are analyzed in this paper. Patients were examined by staff colorectal surgeons and the radiation oncologist. Usually treatments were given in the colorectal surgery department (a few treatments were given in the operating room).

The Philips RT-50™ (Philips, Eindhoven, The Netherlands) contact machine delivered the treatments. This is a superficial orthovoltage unit. After preparation with Fleet® enema (CB Fleet, Lynchburg, VA) before the procedure, a special proctoscope with a 3-cm diameter was inserted. A perianal block was done if necessary. Most patients were treated in the knee chest position, except for certain patients with posterior lesions treated in the lithotomy position for improved exposure. With the Philips RT 50™ unit's design of delivering high doses of radiation with limited penetration, there is rapid drop off in dosage. At 1-cm depth, 35 percent of the dose is delivered, and at 2-cm depth, 14 percent of the dose is delivered. This prevents detrimental effects to surrounding tissue.

Patients received 2,000 to 4,000 rads per treatment every three weeks for three or four treatments. Response to therapy is usually rapid. Nineteen patients had tumors that did not respond after two treatments,

Table 1.
Endocavitary Irradiation

Treatment Characteristics	
Number of fractions	
3	19
4	98
5	6
6	3
Radiation dose	
6,000–8,000 rads	4
9,000–13,000 rads	116
15,000–18,000 rads	6

and these patients were excluded from this study. Table 1 shows the number of treatments and the radiation doses. Exclusion criteria were diagnosis other than adenocarcinoma, pretreatment with external beam radiotherapy, patients treated with a palliative intent, patients receiving less than three treatments, tethered lesions, palpable lymph nodes, and tumors greater than 5 cm in size.

Patients were followed during and after ER with an office proctoscopy to examine the treatment site. Initially patients were followed with monthly examinations. If nothing looked suspicious after three or four visits, the examinations were extended to every three months. After two years, the examinations were extended to every six months. After five years, the patients were examined yearly. All patients developed actinic ulcers at treatment sites. Only suspicious areas were biopsied.

RESULTS

Eighty-two men and 44 women received ER with a curative intent. The mean age was 66.1 (range, 38–99) years. The 126 patients were followed for a mean time of 51.52 (range, 1–136) months.

Eighty-nine (of 126) patients were tumor-free at review (71 percent). Tumor characteristics are shown in Table 2 with separation of recurrence *vs.* no recurrence. Comparing the morphology of the lesion before ER, there was no difference in recurrence if the lesion was polypoid *vs.* ulcerated (Table 3) Mean time to recurrence was 16.08 (range, 0–56) months. It is noteworthy that one recurrence was found almost five years after ER treatment (56 months).

Debulking or surgical excision before ER did not increase the recurrence rate (Table 4). Snare excision facilitated effectiveness of ER treatments.

Of 37 patients with recurrence, 27 had local (within the pelvis) recurrences and 10 had distant recurrence. Thirty-one patients had additional treatment with a curative intent in 23. The secondary treatments are shown in Table 5.

The ten patients with distant recurrence died because of disease. Of the 27 patients with local recurrence, 14 were rendered cancer-free with secondary treatment. Therefore, there was an additional salvage rate of 11 percent (14/126) with additional treatments. Table 6 shows the secondary treatments patients with local disease underwent and their outcomes.

Table 7 summarizes the outcome of all patients. There were 44 patients with follow-up of more than five years. Thirty (68 percent) had no recurrence. With additional treatments, ten more patients were rendered cancer free for a total of 91 percent (40/44) without evidence of disease in this group. Table 8 shows the status of the patients followed for longer than five years.

No significant morbidity was reported in any patient secondary to the treatments. Although actinic ulcers uniformly occurred at all treatment sites, no stomas were needed and no significant bleeding causing transfusions or hospitalization occurred.

DISCUSSION

Local treatment of rectal cancer is ideal for frail, elderly patients who are at poor risk for operative treatment. ER avoids complications seen in abdominal resections (abdominoperineal resection and anterior proctosigmoidectomy) such as urinary and sexual

Table 2.
Tumor Characteristics

	N	TS (cm)	TD			DAV (cm)	F/U (mo)
			Well	Moderate	Poor		
Recurrence	37	2.5 (1–3)	6	25	1	5.2 (0–10)	54.5 (5–132)
No recurrence	89	2.3 (1–5)	21	53	3	5.7 (0–12)	50.2 (0–136)

TS = tumor size; TD = tumor differentiation; DAV = distance from the anal verge; F/U = follow-up.

Table 3.
Tumor Morphology

	Recurrence (%)	No Recurrence (%)
Polypoid	46	46
Ulcerating	35	32
Other	19	22

Table 4.
Debulking or Surgical Excision Before ER

	No.	Yes	No
No recurrence	89	55% (49)	45% (40)
Recurrence	37	30% (11)	70% (26)

Table 5.
Secondary Treatments After ER Failure

APR	13
LAR w/CRA	3
CAA	1
Interstitial XRT	1
Further ER	3
External beam XRT	3
Chemotherapy	2
Multiple treatments	5
	31

APR = abdominoperineal resection; LAR = low anterior anastomosis; CRA = colorectal anastomosis; CAA = coloanal anastomosis; XRT = radiation therapy.

dysfunction or permanent stoma.[2] It is essential that outcomes be comparable if good-risk patients undergo conservative treatment over curative surgery.

ER is only suitable for a small percentage of rectal tumors. Tumors should be less than 5 cm in size and preferably less than 3 cm. Tumors between 3 and 5 cm are treated by overlapping the fields. Sischy[2] reported that a majority of failures occurred in tumors greater than 3 cm. No tumors were greater than 3 cm in our group with recurrence.

Tumors treated with ER should not show evidence of transmural tumor involvement. The tumor should be T2 NO M0 or less. This was determined in the majority of our cases by physical examination looking for tethering or tumor mobility, assuming that freely movable tumors were not invasive. With increasing experience using endoluminal rectal ultrasound, more accurate pretreatment staging can be done. We currently routinely use rectal ultrasound for staging, but this modality was not available for the majority of patients covered in this study.

Absence of positive lymph nodes is a requirement if ER is used for cure. Morson[3] showed that if the cancer was confined to the rectal wall, the incidence of lymphatic metastasis was about 12 percent. Most metastases were seen in poorly differentiated lesions. In our study physical examination was used to determine lymph node status, but rectal ultrasound may prove invaluable to look at the mesorectum.[4]

Other criteria for ER include tumors within 11 to 12 cm of the anal verge (although we tend to operate on young, healthy patients unless a resection would mandate a permanent stoma), absence of anal canal involvement (the anal canal does not tolerate high doses of irradiation), and availability of patients for regular long-term follow-up. Regular follow-up is essential to detect tumor recurrence. Some advocate follow-up for five years,[5] which is reasonable because one recurrence was detected almost five years after treatment in this study. Treatment with ER does not preclude future surgery.[2]

Another essential point for treatment with ER is proper treatment schedules.[5] Treatments should be given in four applications about every three weeks for

Table 6.
Patients with Local Disease

	Secondary Treatment				
	APR	LAR/CAA	EXT Beam/Interstitial Radiation	Further ER	Unknown Refused TX
Alive, cancer free	7	4	1	2*	
Alive, cancer present	2	1	1	1	3
Dead because of cancer	3		2		
Total	12	5	4	3	3 = 27

* Both patients subsequently underwent APR; alive, cancer free.

APR = abdominoperineal resection; LAR = low anterior anastomosis; CAA = coloanal anastomosis; EXT = external; TX = treatment.

Table 7.
Outcome of All Patients Receiving ER for Cure

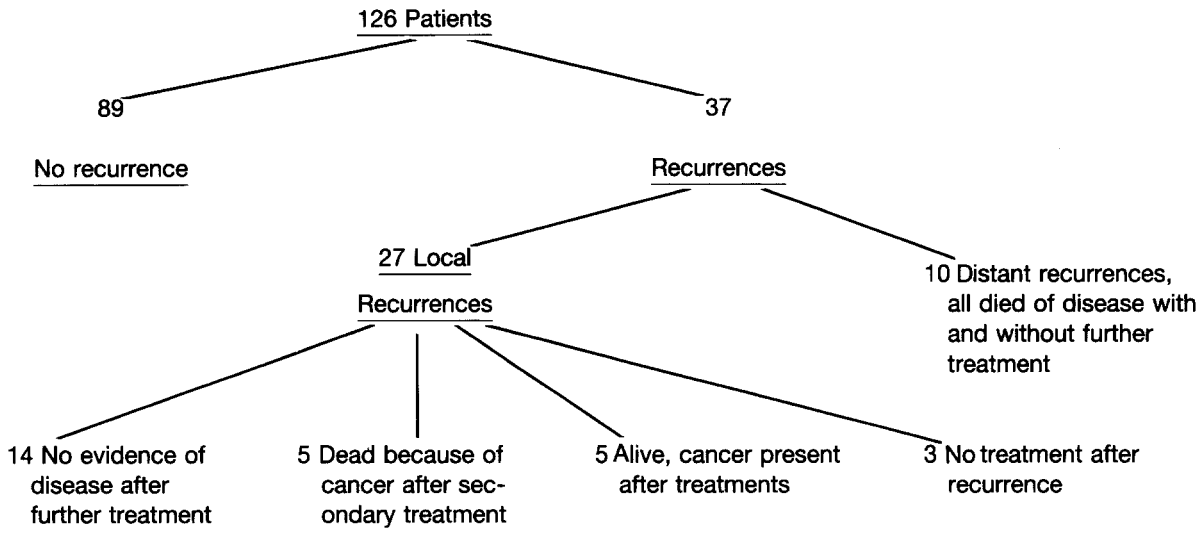
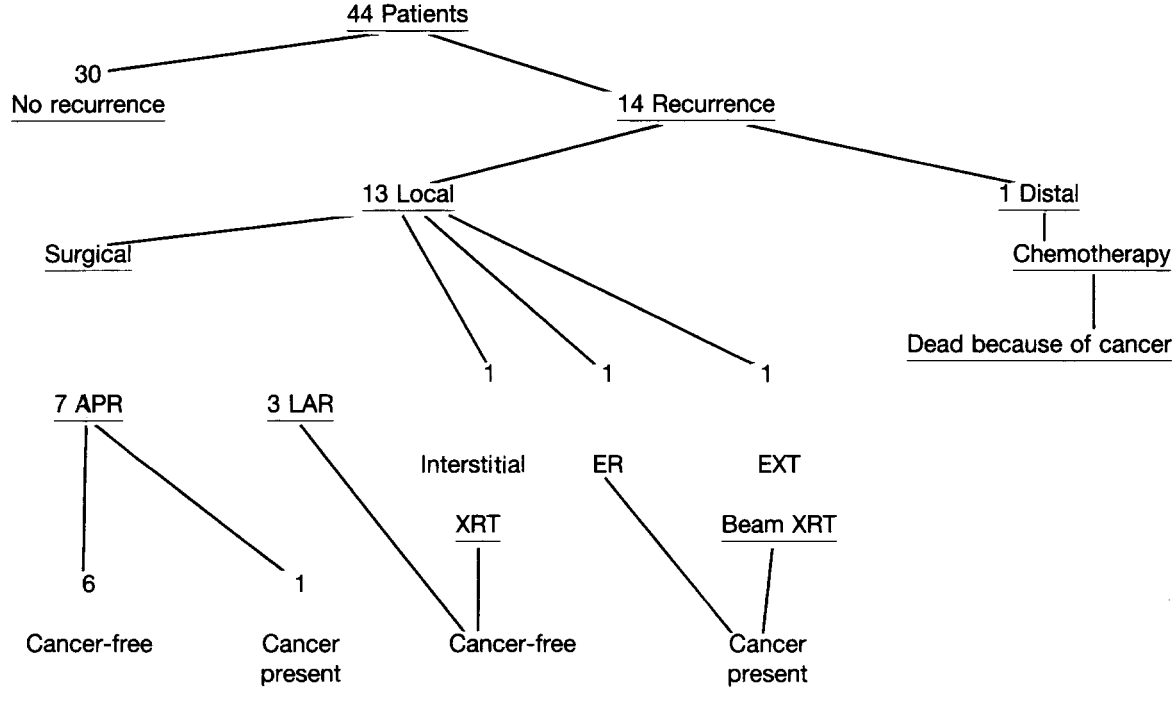


Table 8.
Patients Followed More than 5 Years



APR = abdominoperineal resection; LAR = low anterior anastomosis; XRT = radiation therapy; EXT = external.

optimal effect. If tumor shrinkage is not seen after two treatments another modality should be used.

Debulking or surgical excision before ER did not increase our recurrence rate. Although Fleshman *et al.*[6] believe that local excision followed by ER may be ideal for certain tumors, Sischy *et al.*[7,8] believe that surgical procedures alter the vascular bed of the rectal mucosa, leaving some tumor cells in areas of anoxia and radioresistant. Based on our data, no definite detrimental effects were seen using debulk-

ing or surgical excision, when performed without primary closure.

All patients were carefully followed by staff colorectal surgeons and the treating radiation oncologist. Because some of the treated area heal by fibrosis, nodules that feel like tumors may be palpated.[7,8] Tumor disappearance may take six months by pathologic interpretation.[7] Nonetheless, earlier detection of recurrence with additional secondary treatment (including surgery) would probably have increased our overall salvage from treatment failures. Cytologic scrape smears were not done and might have been helpful. Carcinoembryonic antigen was not uniformly done and was not helpful in detecting early recurrence.

Some centers add external beam radiation or interstitial implants to their ER treatments to increase the treatment effectiveness.[5] Although some of our patients were treated with these other modalities, they were excluded from our study.

CONCLUSION

ER can be an efficacious treatment for selected rectal cancers. Patient selection must be strict to avoid treatment failures. Any tumor that does not show appropriate response to ER should undergo more aggressive therapy. Patients must be willing to undergo long-term follow-up with liberal biopsy of suspicious areas.

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