

Adenocarcinoma of the Rectum: *

Incidence and Locations of Recurrent Tumor Following Present-Day Operations Performed for Cure

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ADENOCARCINOMA of the rectal ampulla might be termed "the most easily detectable internal cancer." Virtually all malignant lesions located in the "true" or infraperitoneal rectum can be palpated by means of simple digital examination.

The relative ease and simplicity of detection conceivably might lead to expectation that most patients with such lesions could have the benefit of early treatment following prompt diagnosis. However, in the usual case a full six months elapses from onset of the initial attention-demanding symptoms to commencement of therapy.¹¹ If one assumes that the earlier a lesion is treated the better the prognosis, and if he recalls that possibility of cure following excision is five times as favorable in patients with lesions yet confined to the bowel wall (Dukes A) as in patients with lesions with lymph node involvement (Dukes C), delay in treatment connotes considerable significance.^{4, 6}

Prediction of a gradual but ever-increasing promptness in diagnosis, however, prophesied as early as 1833 by Lisfranc¹⁶ and reiterated by many of the famous names in cancer surgery at the Berlin Congress on Rectal Cancer in 1900, does not seem to have occurred.^{14, 15} Factors tending to retard this rather elementary avenue for improvement of surgical results likely are complex, but probably include the com-

monly-observed tendency of older patients to attempt rejection of unpleasant reality, as well as the widespread, somewhat unrealistic modesty associated with function of the large bowel.

It would appear, moreover, that no substantial increase in percentage of "early" lesions in patients presenting themselves for therapy is likely to occur until a more purposeful effort is initiated to encourage routine—or even frequent—detection of small, relatively asymptomatic lesions. One possible aid in the accomplishment of such a goal, heretofore quite unexplored, might be the utilization of periodic self-examination to supplement examinations by physicians. The infrequent—but certainly not rare—observation of the patient with minimal symptoms who sharply minimizes delay in treatment following self-examination and detection of a suspicious lesion indicates that such a plan may be worthy of consideration. For example, study of a recent series of 501 patients with rectal cancer seen at this hospital showed that 15 patients (3%) detected their own rectal cancer by self-examination. In this regard, the success of the current campaign for earlier detection of breast cancers by periodic self-examination seems to indicate that gradual public acceptance is within the sphere of possibility. The Cancer Detection Center at the University of Minnesota currently is testing this plan on 100 selected patients.

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Other pathways for future improvement of results of treatment of rectal cancer would appear worthy of consideration. One such method, infrequently employed of late in formulation of operative procedures, was utilized 60 years ago by W. Ernest Miles.¹⁸ He observed that study of the postoperative course of patients who had been subjected to any of several surgical-excision procedures usually disclosed that residual tumor—ostensibly unresected at operation—grew, worsened, and regularly limited the period of postoperative observation to six to 12 months—by death of the patient. Autopsy study often allowed some delineation of areas of deficiency in scope of the then-popular operative procedures. Miles' observations were followed by a series of modifications in operative plan, incorporating areas found at autopsy to harbor rather gross residual or recurrent tumor.

Unfortunately, the operations in vogue prior to introduction of the Miles⁸ operation rarely afforded adequate abdominal exposure. Thus, the possibility of recognition of many already far-advanced lesions was presumably precluded and, doubtless, at times forced even the most competent surgeons to tally as operative failures cases which may have been tabulated by present-day standard as "palliative." In addition, however, and somewhat more frequently emphasized, the virtue of the abdominal approach in permitting more adequate excision of the "upward zone" of tumor dis-

semination was noted repeatedly by Dr. Miles at the autopsy table.

The final Miles abdominoperineal procedure, reported in 1908, followed several modifications in operative plan. It was based on autopsy, operative and clinical observations of areas of recurrent or residual tumor—usually those which manifested themselves early in the postoperative period.

Subsequent surgical experience has repeatedly tended to show that Miles' careful formulation of operation usually has led to accomplishment of this prime objective: elimination of the routine appearance of relatively-early tumor recurrences in those areas found frequently to harbor gross residual tumor. The 50 years since Miles' study have seen some modifications in technique, but the over all plan of the abdominoperineal operation for rectal cancer has remained essentially unchanged.²³

Cases

The group of cases which forms the basis for the present study consists of 125 patients who had postoperative follow up complete in duration; the 125 cases represent all patients who underwent excisions (other than palliative) for adenocarcinoma of the rectal ampulla, from 1940 to 1950 inclusive, at the University of Minnesota Hospitals, and who have subsequently expired (all patients dead as of January 1, 1956; excluding only operative deaths). The larger group of cases of rectal cancer, of which the present

TABLE 1. *Adenocarcinoma of the Rectal Ampulla. 171 Curative Excisions (1940-1950).*

Lesion	No. of Cases	No. of Operative Deaths	Deaths		5-Year Survivors			
			Sooner than 5 Years P. O.		Conventional Calculation		Critical Cancer-Free Calculation	
			Cancer	No. Ca.	No.	%	No.	%
Dukes A	71	1	13	6	51	80	48	68
Dukes B	31	2	13	3	13	50	12	39
Dukes C	69	5	46	4	14	23	9	13
Total	171	8	72	13	78	52	69	40

series of 125 cases forms a part, is reported in detail elsewhere.¹¹ A few aspects of the over-all data, however, are presented in Table 1; it may be noted that the results of surgical therapy, when computed by conventional methods, compare quite well with similar reported series.*

For the 125 cases in this series, the over-all rate of known tumor recurrence was 74 per cent (Table 2). Evidence of local recurrences (in local areas of initial surgical excisions) was present in 51 per cent of those cases with recurrent tumor. The recurrence rate for patients with more advanced lesions (Dukes C and cases requiring enlarged excisions), as might be anticipated, was somewhat higher than that for the group as a whole (Dukes C—82%; enlarged excisions—91%). Patients who had regular excisions for Dukes A lesions exhibited a 55 per cent recurrence rate with 56 per cent local recurrences; and the Dukes B group, 70 per cent, with 43 per cent local recurrences.

Table 2 also shows a further tabulation of cases, listing separately those who had been treated with an abdominoperineal operation and those who had undergone excisions other than the abdominoperineal (anterior operation with low anastomosis, posterior excision, or pull-through procedure). The overall tumor recurrence rate was essentially the same in both groups. Those who underwent abdominoperineal operation (89 cases) had an overall 74 per cent tumor recurrence rate; 48 per cent (32

cases) of these recurrences had local components. Tumor recurrence in local areas was noted in 40 per cent of the Dukes A group recurrences, 36 per cent of the Dukes B and 59 per cent of the Dukes C.

Table 3 shows tabulation of recurrence rates for the abdominoperineal group when patients who survived less than six months postoperatively are excluded. In this tabulation, 70 per cent of the Dukes C recurrences are in the local recurrence group. Also shown in Table 3 is tabulation which excludes—in addition to patients who expired prior to six months postoperatively—those who died after having attained an age of 76 years or more. With this selected group of 59 cases, 83 per cent had recurrent tumor; 61 per cent of the recurrences had local tumor recurrence. In the group of patients with Dukes C lesions, 88 per cent had recurrence of tumor and 78 per cent of these recurrences were local.

Certain aspects of the postoperative course of women who had undergone abdominoperineal excisions are also shown in Table 3; cases who failed to survive six months are excluded. The over all tumor-recurrence rate for women was 87 per cent; the 13 patients who had undergone either a regular excision for Dukes C lesions or an enlarged excision for more advanced tumor had a 100 per cent recurrence rate. Local recurrences, noted in 55 per cent of the recurrent tumors for the group, were present in 67 per cent of the Dukes C recurrences.

Sources of information utilized for compiling data on causes of death, existence of recurrent tumor and sites of tumor recurrence included death certificates, statements from physicians who provided care prior to or at the time of final illness, autopsies, biopsies, reexplorations and clinical examinations. Sources of evidence accepted regarding local-area recurrences, however, were strictly limited to autopsies, biopsies, surgical explorations, and University Hospital clinical examinations (Table 4). Of the 47 cases with local tumor recurrence, 74 per

* Definitions employed. Rectal Ampulla: the 'true' or infraperitoneal rectum; the distal 10 cm. of large bowel. Regular Excision: one of the recognized, commonly-employed excision (or resection or amputation) procedures in general use for bowel cancer. Enlarged Excision: in addition to commonly excised areas, includes substantial additional tissues, i.e., liver, urinary bladder, abdominal wall, etc. Curative Excision: excisions performed with anticipation of cure; no known residual tumor recognized at the completion of operation. Palliative: Excisions which allowed definite, known tumor to remain.^{9, 10}

TABLE 2. *Adenocarcinoma of the Rectal Ampulla. Recurrent Cancer Following Abdominoperineal and Other Excisions*

	No. of Cases	Recurrent Tumor			
		All Recurrences		Local Recurrences	
		Number	%	Number	% of Total
Abdominoperineal					
Dukes A	19	10	53	4	40
Dukes B	16	11	59	4	36
Dukes C	42	34	81	20	59
"Enlarged"	9	9	100	4	44
Other	3	2	67	—	—
Total	89	66	74	32	48
Other Excisions					
Dukes A	10	6	60	5	83
Dukes B	4	3	75	2	67
Dukes C	15	13	87	6	46
"Enlarged"	2	1	50	—	—
Other	5	4	80	2	50
Total	36	27	75	15	56
All Cases					
Dukes A	29	16	55	9	56
Dukes B	20	14	70	6	43
Dukes C	57	47	82	26	55
"Enlarged"	11	10	91	4	40
Other	8	6	75	2	33
Total	125	93	74	47	51

TABLE 3. *Adenocarcinoma of the "True" Rectum. Incidence of Recurrent Tumor.*

		No. of Cases	% with Tumor Recurrence	% of Recurrences Local
Patients surviving 6 months or more p. o.	Dukes A & B cases	33	64	38
	Dukes C cases and those requiring enlarged resection	41	85	66
	Other	3	67	—
	Total	77	75	53
Women surviving 6 months or more p. o.	Dukes A & B cases	10	70	30
	Dukes C cases and those requiring enlarged resection	13	100	69
	Other	—	—	—
	Total	23	87	55
Patients surviving 6 months or more p. o. who expired prior to 76 years	Dukes A & B cases	25	72	44
	Dukes C cases and those requiring enlarged resection	33	91	73
	Other	1	100	—
	Total	59	83	61

TABLE 4. *Adenocarcinoma of the Rectum. Sites of Local Tumor Recurrence. SOURCES OF INFORMATION*

	Number of Cases	% of Total
Biopsy and/or exploration	35	74
Examination at U. H.	7	15
Autopsy	5	11
Total	47	100

cent had evidence from biopsy and/or surgical exploration; in 11 per cent autopsy was done; and in 15 per cent University Hospital clinical examinations gave definite indication of local recurrence.

The patients who presented evidence of local tumor recurrence following performance of abdominoperineal operations are individually tabulated in Table 5. Each patient is identified by initials; age at operation, postoperative survival (in months) and source of evidence on recurrence are listed for each patient, together with a brief indication of available information on locations of residual or recurrent-tumor deposits in areas in local proximity to the borders of the scope of the initial tumor excision (Table 6).

Discussion and Conclusions

Survival rates for rectal ampullary carcinoma, when calculated by methods in general use today, compare favorably for the patients seen here with those reported elsewhere.^{2, 5, 13, 17, 20} The rates, however, when computed utilizing a tabulation which may be considered more precise than that in general use, together with a longer postoperative follow up of patients, would seem to allow a more exacting evaluation of certain aspects of the curative worth of present-day operative procedures.¹² It may be noted, in contrast with the patients with Dukes A lesions who had nearly a 75 per cent rate of survival following abdominoperineal excision for cure, that those with Dukes C lesions, although also operated

upon with the hopeful anticipation of cure, had but a modest chance of achieving a five-year, cancer-free survival.

To aid in clarification of some of the factors which might be responsible for curative failure following employment of the seemingly-adequate and generally-utilized excision procedures, the group of 125 cases, representing patients dead after excisions, was studied. It is apparent that as the length of postoperative follow up varies and the composition of the group is thus affected, significance—with some exceptions—cannot be attached to the absolute number of patients with recurrent tumor in any given group. The figures which would appear to have significant implications, however, are those indicating the frequency of occurrence of local-area tumor in those cases who did display recurrences. In addition, the over-all tumor-recurrence rates would seem noteworthy; for example, the 81 per cent rate noted for patients who expired following excision of Dukes C lesions would answer any conjecture that the very modest absolute-cure rate noted for Dukes C lesion patients following abdominoperineal excisions, in any significant part, might be owing to factors other than failure of the operation to accomplish more than subtotal excision of the malignant tumors.

Because in the data compilation definite evidence was required for the presence of local recurrence before such classification was made; because some cases who eventually had generalized tumor and are so classified may at one time have had localized tumor recurrence; and because some few patients who expired from causes certified as other than recurrent tumor may have also had tumor recurrence, the figures presented, both in regard to over all tumor-recurrence rate and percentage of local recurrences, likely can be considered as absolute minimal. More frequent follow up examinations (most urgently in Dukes C instances, and especially in women patients), as well as more frequent asymptomatic re-

TABLE 6. *Adenocarcinoma of the Rectum.*
Sites of Recurrent Tumor.

Areas of Recurrence	No. of Men	No. of Women
Anterior area		
Vaginal wall, <i>cul-de-sac</i>		7
Urinary bladder	3	1
Peri-ureteral area	3	0
Prostate gland	1	
Posterior area		
Posterior pelvic, pre-sacral-coccygeal, sacral plexus, sciatic area	13	1
Aortic bifurcation, iliac artery area	1	1
Obturator area	1	1
Other		
Perineum	5	0
Left pelvic area	1	0

explorations (including perineal reexploration), could be expected to increase knowledge of sites of early postoperative tumor recurrences, as well as provide delineation of areas of greatest deficiency in scope of currently-popular excision procedures.¹

It may be noted that although tabulation revealed an over all recurrence rate of 74 per cent for patients who underwent abdominoperineal operation, cases for which the Miles operation appears to have been especially designed—patients with Dukes C lesions—showed even a higher rate (81%) than the overall average; in women, the rate was 100 per cent.

To minimize certain factors which might possibly lead to falsely-high recurrence rates, calculation excluding patients who failed to survive six months after operation was also made. Although the over all recurrence rate (Table 3) remains essentially the same, what may possibly be a clearer picture of local area recurrence is revealed: 70 per cent of the recurrences in the Dukes C group were local. In addition, speculating that in very old patients the immediate

causes of death possibly might be so conspicuous that asymptomatic or localized tumor recurrences more easily could be overlooked, calculations excluding patients 76 years old or older at death, as well as those who failed to survive six months postoperatively, indicated a recurrence rate of 83 per cent. Of the 88 per cent of the Dukes C group who had proven recurrent tumor, 78 per cent had local-area recurrences.⁷

Of especial interest is the group of women who had expired subsequent to having undergone abdominoperineal excision. Few, indeed, who expired during the period of this study, escaped without recurrent tumor (87% recurrence).

The individual locations of those tumor recurrences tabulated as "local,"—Table 5—are all in fair proximity to the usual borders of the commonly-employed excision procedures. It is worthy of note that Poirier's employment of a sagittal-section view of the pelvis to illustrate lymph-node drainage areas and lymphatics of the rectum, when considered together with the tabulated sites of locally-recurrent tumor in the present series, suggests that when Miles described his operation as covering the "zones of upward, downward, and lateral" dissemination of rectal tumor, adequate consideration of potentiality of spread in the anterior-posterior dimension was lacking.^{9, 21}

The frequent identification of local-area recurrent tumor in the vaginal wall, *cul-de-sac* area (64% of local recurrences following abdominoperineal excision) doubtless is related to the continuity of the lymphatics of these organs, as well as their close proximity.^{10, 19} Clearly, the area of the vaginal wall appears to be the most conspicuous area for incorporation in any revised plan of operative excision which might benefit more of the patients with Dukes C lesions, those who presently are being offered little more than a token chance of cure with the operative procedures currently in use.^{8, 25}

Several other areas of the pelvis, appearing to constitute deficiency in the scope of excision of the abdominoperineal operation, are also in the anterior-posterior dimension. Many local area recurrences were noted in what might be called the posterior pelvic-presacral-sacral plexus area. Other recurrences in areas contiguous with the borders of usually-employed curative excisions were found to be present, in men, in the prostate gland-base of bladder-distal ureter area, or in women, the vaginal wall, *cul-de-sac* area.^{3, 22, 24} The additional area of conspicuous recurrence, in the precoccygeal-perineal area, also appears worthy of note.

Summary

1. A study was made of the incidence and location of known recurrent tumor in patients who expired subsequent to "non-palliative" surgical excisions for carcinoma of the rectal ampulla.

2. About three-fourths of these patients had recurrent tumor; more than 50 per cent of the recurrences were—at least in part—in local areas, close to or contiguous with the borders of the initial excision procedures.

3. Most cases with locally-recurrent tumor following abdominoperineal excision—both men and women—had recurrences in the anterior-posterior plane. In women the most frequent area of recurrence was the vaginal wall-*cul-de-sac* area; in men the posterior pelvic-presacral area.

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