

Extended Resection for Selected Adenocarcinomas of the Large Bowel

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A LARGE NUMBER and wide variety of technics have been utilized in this century in an effort to improve the survival of patients with adenocarcinoma of the large intestine. Miles' demonstration of the value of patterns of local growth and dissemination in designing appropriate resections was a major advance,⁶ but subsequent treatment modifications, with the possible exception of the "no touch isolation" technic¹⁷ have proved of very limited usefulness in increasing the true salvage rate of patients harboring colorectal adenocarcinoma. Indeed, at least two studies indicate that virtually all improvement in overall survival has been due to increased rates of operability and resectability and to striking decreases in treatment or operative mortality.^{3, 10}

The continuing studies of Spratt and associates have better defined many characteristics of large intestinal cancer with respect to both treatment options and effect upon

survival.¹⁴ Some informative correlations have developed from these studies. A case in point is the observation that direct neoplastic extension to an adjacent organ is not a statistically more adverse prognostic sign than one to five regional lymph node metastases. Many colorectal tumors are eagerly resected in the presence of obvious or suspected regional spread, but few are so attacked when the tumor extends into another organ. It has been established that tumor size is *not* a determinant of regional metastases in large bowel cancer.^{12, 13} Actually, the seemingly advanced colorectal cancer which has invaded another organ often bears specific extremely favorable biologic characteristics, viz. the tendency to well-differentiated histologic appearance, large size without regional lymph node metastases, long duration without dissemination, "pushing" tumor margins, and the microscopic presence of inflammatory response about the primary tumor. Furthermore, metastases via the drainage routes of the invaded organ almost never occur.

The purpose of the report is to describe a specific attempt to ascertain whether such lesions, approached aggressively, could be

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treated for cure with acceptable treatment mortality and morbidity and with significant contribution to increasing long-term patient salvage.

Materials and Methods

Adenocarcinoma of the colon or rectum was initially diagnosed in 437 patients at the Jackson Memorial Hospital, Miami, Florida, in 1965–1970 inclusive. Thirty patients underwent extended or multiple organ resections in an effort to control primary or recurrent cancer during this period. This report concerns the 24 such patients personally cared for by the author, either directly or as attending surgeon on the ward service. Specifically excluded are those patients undergoing standard pelvic exenteration¹ and those requiring multiple organ resections for exposure. The value of both these procedures in selected instances is well documented.

Preparation of the patient for such operations does not deviate significantly from that for patients expected to have standard resections. However, the bulky tumor mass was often palpable and in more than half the patients, extension to adjacent organs was suspected preoperatively. Judicious replenishment of red cell deficits⁷ and a short course of a systemic antibiotic to minimize wound and intra-abdominal infection⁸ were regularly practiced. Intestinal preparation consisted only of laxatives and liquid diets.

The operative procedures *per se* were so thoroughly individualized that no technics became routine. However, the procedures were generally based upon certain concepts which may be of use to others contemplating such resections. First and foremost is the mental and emotional preparation to undertake a resection which is not standard and often requires moment to moment improvisation. Should abdominal wall involvement be suspected, the incision must be placed so as to contribute, or at least not interfere with, abdominal wall reconstruction. The incision must avoid the neo-

plastic extension at all costs. The tumor and its attachments should not be disturbed until a thorough assessment of distant metastatic sites and coexistent intra-abdominal problems have been completed. Exploratory dissections to establish resectability must neither violate the tumor nor commit one via destruction of blood supply to a resection which is neither technically feasible nor biologically wise. On occasion, determination of resectability requires more than token imagination, both as to extirpation and reasonable reconstruction. Whether the adherent organ is so by virtue of inflammation or neoplastic attachment should be determined only upon pathologic study of the specimen; to biopsy or attempt separation is to promote dissemination. To compromise upon some margins of resection in an often massive, multiple organ excision is a temptation which must be ignored at all costs. The entire tumor must be removed *en bloc* and, insofar as possible, with respect to Turnbull's "no-touch isolation" technic.¹⁷ The latter goal cannot always be achieved, particularly in pelvic dissections where one must often "get a handle" upon the lesion. Finally, the methods of reconstruction must be chosen for their security. Indeed, the sole hospital death was predicated by complications arising from ureteral reconstruction after right colectomy with *en bloc* segments of iliac crest, abdominal wall, a loop of small bowel, and much of the right ureter. Preferred technics for abdominal wall reconstruction have been described elsewhere.¹¹

Results

The median age of the 24 patients was 63 years at the time of resection. Mean anesthesia time and intraoperative blood transfusion volume were 215 minutes and 625 ml., respectively. The median duration of hospitalization was 18 days. The median maximum chordal dimension of the primary tumor was 8 cm., indicative of the very large size of the cancers in question. The

TABLE 1. *Additional Organs Excised*

Abdominal wall	7
Uterus	6
Small bowel	4
Stomach, vagina, bladder, ureter	3 each
Liver, duodenum, S & O	2 each

mean number of organs resected was 2.7 and is specified in Table 1. One of the 24 patients (4%) died in the hospital two months after operation; a total of nine patients sustained at least one major complication.

Five individuals underwent multiple organ excisions for recurrent colorectal adenocarcinoma; three were treated for two recurrences of the disease. All patients with recurrent carcinoma had microscopically confirmed neoplastic invasion of adjacent organs.

Of the 19 patients requiring extended resection for primary large bowel carcinomas, two had only inflammatory adhesions to the adjacent organs. The cause of adherence to the 29 additional organs resected in these 19 patients was carcinoma in 25 organs and inflammation in four.

Survival of patients following extended resection is summarized in Table 2. The author personally examined each survivor in April–June 1971 to ascertain his clinical status. Three of the five patients treated for recurrence died of the disease 10, 30 and 33 months after multiple organ resection; one patient is alive with clinical re-recurrence 36 months after extended operation. The other patient is free of cancer 17 months

TABLE 2. *Survival after Extended Resection*

	# Pts.	%	Mean or Median Surv.
Hosp. deaths	1	4	—
Dead rec. cancer	8	33	28 mo.
Dead intercurrent dis.	3	—	41 mo.
Alive with cancer	2	—	33 mo.
Alive and well	10	42	25 mo.

after extensive abdominal wall resection, partial cystectomy and segmental small bowel resection for a cancer recurrent in her incision after a previously compromised re-excision of the surgical wound for isolated recurrent cancer.

The 19 patients treated for extensive primary disease include the sole hospital death and five other patients in whom cancer was not controlled by even extended resection; they survived nine, 16, 27, 30, and 36 months after operation. Three died of disseminated cancer without local recurrence whereas the other two suffered largely from failure to control their cancer locally. Nine patients are well and clinically free of cancer six, 18, 23, 24, 25, 30, 40, 42, and 47 months after operation. Among the survivors are the two patients in whom adjacent organ involvement proved to be only inflammatory.

Another patient is presently alive with liver metastases 30 months after resection and three patients died of intercurrent disease without evidence of cancer 32, 41, and 55 months after extended resection. Absence of tumor was confirmed in two at autopsy.

Discussion

This report is but a link in a growing chain of data as to the biologic variability of colorectal cancers. The relatively favorable tumor-free survival rate of 42% and the longevity of patients ultimately dying of carcinoma in our highly selected experience are strong evidence that one can clinically select tumors which bear less virulent courses than do ordinary large bowel cancers. Others have indicated as much.¹⁵ Whether such efforts will increase the *overall* recovery from colorectal cancer remains to be seen. An educated guess suggests that about 8% of patients seen may be amenable to extended resection for cure and 40% may be "cured." The net increase in survival, at best, is then three to four patients per hundred seen. Perhaps the major contribu-

tion of this effort is that extended, multiple organ resections can be accomplished with acceptable risk to the patient. Indeed, the operative (hospital) mortality for these cases is identical to that for *standard* colorectal excisions for cancer at the university medical centers.¹⁰

It is obvious that those patients seemingly well after multiple organ resections for extensive primary cancers must be followed for a longer period to ascertain that the salvage anticipated will be realized. This may be especially true in view of the relatively favorable tumor characteristics which led to the patients' being selected for resection in the first place. The same characteristics may portend slow growth and late recurrence.

Our seeming lesser success with extensively recurrent colorectal adenocarcinomas may be but an obvious expression of the less favorable nature of the tumor destined to recur. Spratt and I have studied the entire follow-up process and concluded that more aggressive treatment of certain locally recurrent colorectal adenocarcinomas was warranted.⁹ Dunphy, among others, has described favorable results from attempts to control recurrent tumors in such patients.² The five patients with recurrent cancer involving several organs were an especially challenging group and it may be that a 20% conversion rate to tumor-free status is acceptable. For example, only one of these patients allowed the excision of as few as two organs and one man required the resection of portions of five organs to excise all gross tumor.

This report is by no means unique for there has been an irregular flow of reports partially defining the role of such resections for selected colorectal cancers. Recently, Jensen, Balslev, and Nielson briefly described their experience in Copenhagen⁵ in which 10% of all admissions with colonic adenocarcinoma required "extensive surgery." Their operative mortality rate was 22% for such operations. They found that

only five of 37 (14%) patients with histologic verification of cancerous involvement of another organ were alive 5 years after resection. Similar comparisons from the present report indicate eight of 24 of such patients to be free of cancer, but at an earlier time post-resection. Abdominal wall involvement was virtually the only site associated with favorable survival in Copenhagen; the present report indicates a broader applicability. El Domeiri and Whiteley⁴ have also described significant tumor control among patients whose resectable cecal cancer involves abdominal wall.

As is so often the case, clinical documentation of many of the tenets advanced in this report long preceded the rationale which evolved from the studies of Spratt and colleagues. In 1946, Sugarbaker¹⁶ described appreciable salvage among patients requiring multiple organ resections for extensive colorectal carcinoma and noted that extension to adjacent organs was frequently not accompanied by other adverse prognostic determinants of the cancer. Subsequently, Van Prohaska and associates¹⁸ described a similar experience with a commendable proportion of apparent cures and but one death among 21 such resections. Indeed, initially all of the principles and concepts espoused in this report may be found in the earlier narratives of Sugarbaker and Van Prohaska.

Such reports lend some credence to the likelihood that 2- to 3-year survivals, even in these relatively favorable tumors, will be generally equitable to 5-year control figures. Of 23 patients in the experience of Sugarbaker and Van Prohaska who ultimately died of tumor, the median survival was just under 2 years, a figure well within the time range of this study.

Summary

Seemingly advanced adenocarcinomas of the large bowel which invade adjacent or-

gans but bear other favorable prognostic characteristics may be clinically identified. Multiple organ resections in judiciously selected patients with such tumors appear to control the neoplasm in a substantial number of patients and may be conducted with acceptable operative risk. Such undertakings may allow a small but clearly identifiable increase in overall patient salvage from adenocarcinoma of the large bowel.

References

1. Butcher, H. R., Jr. and Spjut, H. J.: Evaluation of Pelvic Exenteration for Advanced Carcinoma of Lower Colon. *Cancer*, **12**:681, 1959.
2. Dunphy, J. E.: Recurrent Cancer of the Colon and Rectum. *N. Engl. J. Med.*, **237**:111, 1947.
3. Ederer, F., Cutler, S. J. and Eisenberg, H.: Survival of Patients with Cancer of the Large Intestine and Rectum, Connecticut, 1935-54. *J. Natl. Can. Inst.*, **26**:489, 1961.
4. El-Domeiri, A. and Whiteley, H. W., Jr.: Prognostic Significance of Abdominal Wall Involvement in Carcinoma of Cecum. *Cancer*, **26**:554, 1970.
5. Jenson, H. E., Balslev, I. and Nielson, Jr.: Extensive Surgery in Treatment of Carcinoma of the Colon. *Acta. Chir. Scand.*, **136**:431, 1970.
6. Miles, W. E.: A Method of Performing Abdomino-perineal Excision for Carcinoma of the Rectum and of the Terminal Portion of the Pelvic Colon. *Lancet*, **2**:1812, 1908.
7. Peden, J. C., Jr., Maxwell, M., Ohin, A. and Moyer, C. A.: A Consideration of Indications for Preoperative Transfusions Based on Analysis of Blood Volumes and Circulating Proteins in Normal and Malnourished Pa-

- tients with and without Cancer. *Ann. Surg.*, **151**:303, 1960.
8. Polk, H. C., Jr. and Lopez-Mayor, J. F.: Post-operative Wound Infection: A Prospective Study of Determinant Factors and Prevention. *Surgery*, **66**:97, 1969.
9. Polk, H. C., Jr. and Spratt, J. S., Jr.: Recurrent Colorectal Carcinoma: Detection, Treatment and Other Considerations. *Surgery*, **69**:9, 1971.
10. Polk, H. C., Jr., Spratt, J. S., Jr., Copher, G. H. and Butcher, H. R., Jr.: Surgical Mortality and Survival from Colonic Carcinoma. *Arch. Surg.*, **89**:16, 1964.
11. Polk, H. C., Jr. and Warren, W. D.: Incisions and Related Considerations, in Turell, R., ed., *Diseases of the Colon and Anorectum*. Second edition. Philadelphia, W. B. Saunders Co., 1969.
12. Spratt, J. S., Jr.: The Lognormal Frequency Distribution and Human Cancer. *J. Surg. Res.*, **9**:151, 1969.
13. Spratt, J. S., Jr. and Ackerman, L. V.: Relationship of the Size of Colonic Tumors to Their Cellular Composition and Biological Behavior. *Surg. Forum*, **10**:56, 1960.
14. Spratt, J. S., Jr. and Spjut, H. J.: Prevalence and Prognosis of Individual Clinical and Pathologic Variables Associated with Colorectal Carcinoma. *Cancer*, **20**:1976, 1967.
15. Spratt, J. S., Jr., Watson, F. R. and Pratt, J. L.: Characteristics of a Variant of Colorectal Carcinoma that Does Not Metastasize to Lymph Nodes. *Dis. Colon Rectum*, **13**:243, 1970.
16. Sugarbaker, E. D.: Coincident Removal of Additional Structures in Resections for Carcinoma of the Colon and Rectum. *Ann. Surg.*, **123**:1036, 1946.
17. Turnbull, R. B., Jr., Kyle, K., Watson, F. and Spratt, J. S.: Cancer of the Colon: The Influence of the No-touch Isolation Technic on Survival Rates. *Ann. Surg.*, **166**:420, 1967.
18. Van Prohaska, Jr., Govostis, M. C. and Wasick, M.: Multiple Organ Resection for Advanced Carcinoma of the Colon and Rectum. *Surg., Gynecol. Obstet.*, **97**:177, 1953.

DISCUSSION

DR. JAMES E. DAVIS (Durham): I will limit my remarks to Dr. McSwain's paper and would like to ask three questions:

We were encouraged this morning by Dr. Rhoads to remove polyps of the colon, and since Dr. McSwain is renowned both as a pathologist and as a surgeon, I would be interested in his opinion concerning the importance of the size of a polyp. Is it safe to observe, without removal, a polyp of certain size?

I am impressed with the fact that none of his juvenile polyps were associated with polyps that have a greater propensity for malignant change, and in his series associated polyps were not removed. Has this safely been documented by others, and is it safe to leave multiple polyps if one is proved to be of the juvenile type?

Also, I would be interested in his assessment of the value of the colonoscope in the management of such polyps. Obviously, this instrument was not available to him at the time this series of cases was being accumulated, but had it been available, conceivably the 21 per cent of his patients who underwent laparotomy might have been avoided.

DR. EUGENE M. BRICKER: I am going to confine my remarks to the paper that was presented by Dr. Polk.

I wish to congratulate Dr. Polk on what I consider to be a worthwhile study and a very excellent presentation. As he suggests, it is probable that application of the principles he enumerated to advanced and recurrent lesions such as he described will not appreciably affect the over-all survival rate of colorectal cancer; but there need