Cancer of the Colon: The Influence of the *No-Touch Isolation* Technic on Survival Rates

Rupert B. Turnbull, Jr., M.D.; Kenneth Kyle, M.B., M.Ch.; Frank R. Watson, Ph.D., and John Spratt, M.D.

It has long been suspected that cancers may be disseminated through the bloodstream by the trauma of surgical removal. In 1913, Tyzzer, after investigating cancer of the breast in mice, suggested that surgeons should consider cancers of the breast "explosive" and handle them accordingly.[1] In 1952, Barnes decribed a special technic for resecting the right side of the colon for cancer.[2] He advocated ligation of the vascular pedicles and division of the bowel before handling the cancer-bearing segment. In 1954, Cole, Packard, and Southwick reported finding cancer cells in the portal venous blood of a perfused resected cancer-bearing segment of human colon.[3] This observation gave rise to their suggestion that the vascular pedicle should be ligated before significant operative manipulation is undertaken.

In 1955, Fisher and Turnbull reported cancer cells in the portal venous blood of 8 of 25 resected segments (for cancer) of the colon, and suggested that the cells had been scattered by operative manipulation.[4]

In late 1953, one of us (R. B. T., Jr.) adopted a technic of colon resection for cancer wherein the cancer-bearing segment was not manipulated or handled in any manner until after the lymphovascular pedicles were divided and ligated and the colon was divided at the elected sites for resection. (Fig. 1.) To emphasize the type of technic, the name *no-touch isolation* was adopted. This method of resection has been applied to every cancer of the colon operated upon by the senior author since that time (1953–1964). During this time, five staff surgeons at the Cleveland Clinic Hospital continued to perform resections of the colon with the *conventional* technic, which is characterized by ligation and division of the lymphovascular pedicles *after* mobilization of the cancer-bearing segment. (Fig. 2.)

Material and Methods

This report is based on a computer analysis of the results of surgical treatment of 896 patients with cancer of the colon treated at the Cleveland Clinic Hospital from 1950 to 1964. One of the authors (K. K.) reviewed the records of 2,225 patients with a diagnosis of malignancy of the colon, rectum, and anus recorded at the Cleveland Clinic Foundation from 1950 to 1964. (Table 1.) A systematic follow-up study was instituted and all pertinent data were recorded on in-

Dr. Turnbull is a member of the staff, Department of General Surgery, The Cleveland Clinic Foundation, Cleveland, Ohio.

Dr. Kyle is a surgeon, Royal Victoria Hospital, Belfast, Ireland; John M. Wilson Memorial Cancer Research Fellow, The Cleveland Clinic Foundation, 1965.

Dr. Watson is Associate Research Statistician, Ellis Fischel State Hospital and Cancer Research Center; Associate Professor, Community Health and Medical Practice, University of Missouri, Columbia, Missouri.

Dr. Spratt is Chief Surgeon, Ellis Fischel State Cancer Hospital; Professor of Surgery, University of Missouri.

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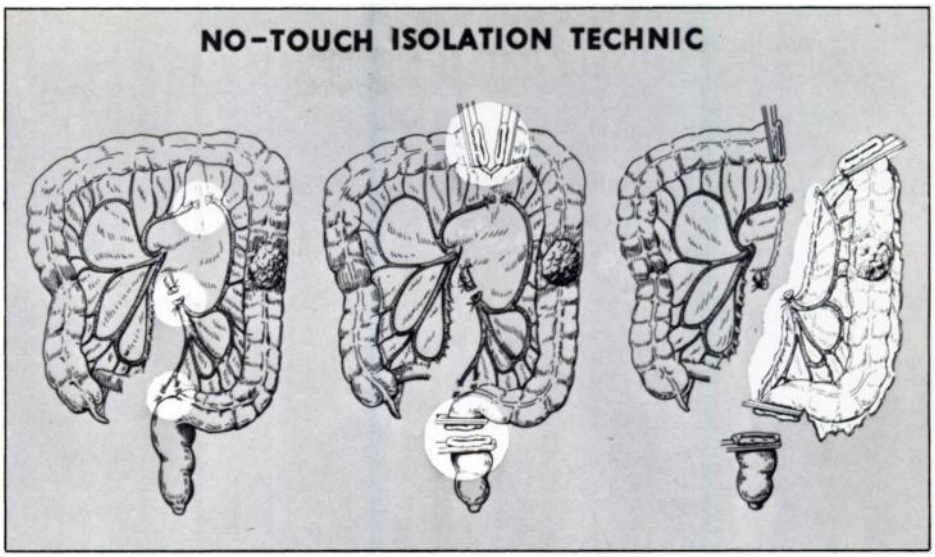

Fig. 1. The lymphovascular pedicles are isolated and divided; the colon is divided at the elected sites of resection; the cancer-bearing segment is removed last.

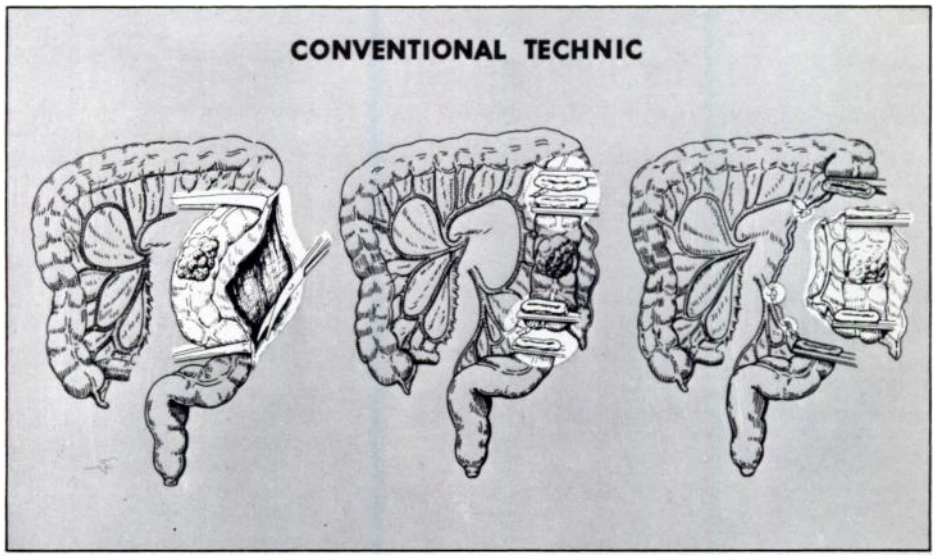

Fig. 2. The cancer-bearing segment is mobilized as the first step; the colon is divided at the elected sites of resection. The lymphovascular pedicles are divided as the final maneuver.

dividual code sheets. From these data, IBM cards were punched and then twice verified at a data processing center in Cleveland. The data were then subjected to statistical analyses by the other authors (F. R. W. and J. S.) at the University of Missouri Computer Center at Columbia, Missouri.

Of 2,225 patients with a diagnosis of a primary malignancy of the colon, rectum, or anus, only 35 were lost to follow-up. Because this report is based on survival rates among patients with cancer of the colon, the following

Table 1

CANCER OF THE COLON, RECTUM, ANUS—CLEVELAND CLINIC—1950-1964
2,225 patients for treatment 35 patients lost to follow-up

Table 2

CANCER OF THE COLON—1950-1964
896 patients Lost to follow-up: 21 patients

patients were excluded from the study: patients with cancer in a polyp, with cancer of the rectum or anus, or carcinoid tumors, malignancy other than adenocarcinoma, patients operated upon first at other hospitals, and patients not operated on at the Cleveland Clinic Hospital. Of these some were seen in other hospitals in consultation, and a few refused to undergo operative treatment.

Cancers of the colon were defined as those tumors located at or above a point 5½ inches (14 cm.) above the anus, as recorded at the time of proctosigmoidoscopic examination. (Fig. 3.) The level of each tumor was determined preoperatively by the operating surgeon. After the above exclusions, there were 1,707 patients with cancer of the colon and rectum. The data of 811 patients with cancers of the rectum were excluded from the study, leaving those of 896 patients with cancer of the colon for statistical analysis. (Table 2.)

Pathology

Adenocarcinoma of the colon was divided into four *clinicopathologic* stages: Stage A—Tumor confined to the colon and its coats; Stage B—Tumor extension into pericolic fat; Stage C—Tumor metastasis to regional mesenteric lymph nodes, but no evidence of distant spread; Stage D—Tumor metastasis to liver, lung, bone, seeding of tumor, irremovable because of parietal invasion; adjacent organ invasion. The histologic grade of each tumor was recorded but was not included in the clinicopathologic staging of this report.

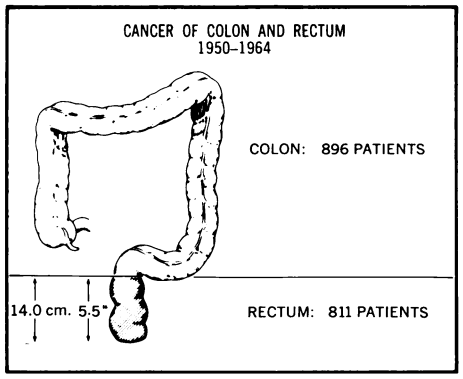

Fig. 3

Most tumors were reported as grade 3 and moderately dedifferentiated. After operation the pathologic specimens were immediately fixed in alcohol-formalin and later were opened through the base of the tumor, and the depth of fat invasion was measured and recorded. The mesenteric fat was cut into 3 mm. slices, and the lymph nodes were dissected out and sectioned. No attempt was made to record the location of metastatic nodes in relation to the tumor.

The pathologic reporting of specimens was consistently performed by the same three pathologists over the 14 years of this study.

Calculation of Survival Rates

Survival rates were calculated by the actuarial method, and life tables were prepared to show survival rates with and without correction for age. The median ages of the patients ranged from 60 to 63 years between individual life tables. In regard to survival rates calculated without correction for age—postoperative deaths, death from cancer, death from natural causes were all considered deaths from cancer. Age-corrected survival rates

were calculated in the usual manner, utilizing the life tables for "Ohio" white males, 1959 through 1961.[5]

Results

The data of 896 patients with cancer of the colon were considered suitable for analysis, but 21 were lost to follow-up observation. There was an operability rate of 96 per cent.

Six hundred sixty-four patients were treated by one surgeon (R. B. T., Jr.) who used the *no-touch isolation* technic when resection was indicated. Five other staff surgeons operated upon 232 patients using a *conventional* technic when resection was indicated. The proportions of Stages of cancer in both groups are shown in Figure 4. Other than Stage A cancers, the proportions are similar. The resectability rates were the same in both groups.

CRUDE SURVIVAL RATES. The life table for Stages A, B, C, and D cancers of the colon is shown in Figure 5. The accumulative five-year survival rate without correction for age is 46.9 per cent for 896 patients considered for treatment at the Cleveland Clinic Hospital. The resectability rate was 84.2 per cent. The operability rate was 96.2 per cent. Since the five-year survival rate was unusually high (the usual rates are 25 to 35 per cent), it

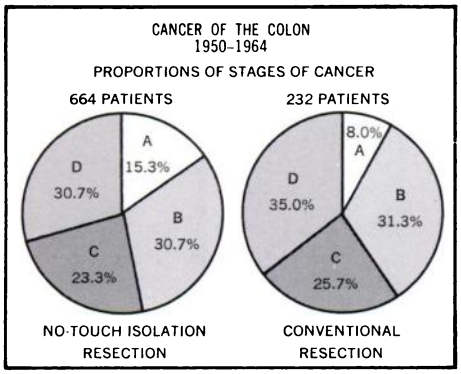

Fig. 4

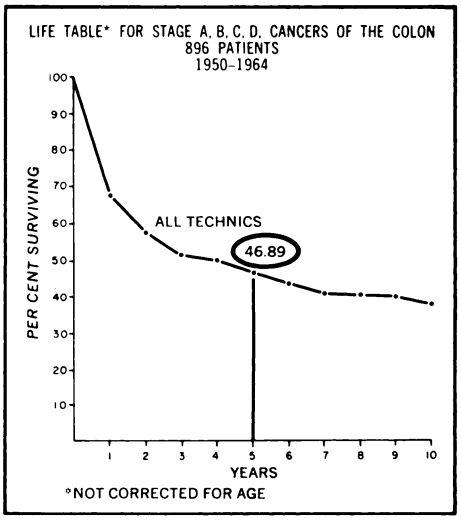

Fig. 5

was decided to compare the rates according to the surgical technics. Figure 6 compares survival rates for Stages A, B, C, and D cancers of the colon according to surgical technic. The resectability rates were the same in both groups.

It will be readily noted that deaths from metastatic cancer were more frequent during the two years after the *conventional* technic resection. Most of these deaths were due to me-

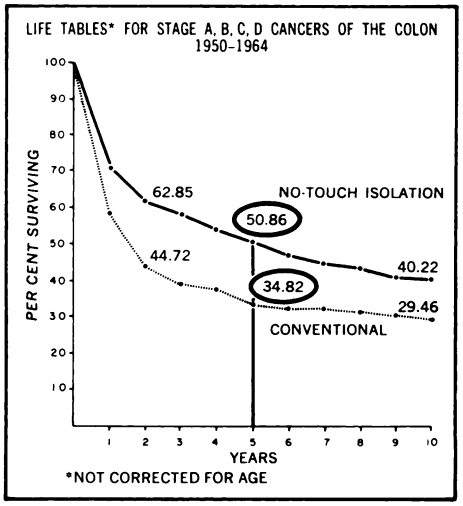

Fig. 6

tastasis to the liver, and it is suggested that this greater incidence of fatal hepatic metastasis is secondary to operative manipulation of the cancer-bearing segment.

RESECTION FOR CURE. Figure 7 presents comparative life tables of patients who underwent resection for cure of Stages A, B, and C cancers of the colon. There were 460 patients who underwent resection by the *no-touch isolation* technic, and 128 patients by the *conventional* method. Again, it is apparent that the death rate (from hepatic metastasis) is greater in the first two years after *conventional* resection, and that the five-year survival of the *no-touch isolation* group is unusually high.

Since life tables for combined Stages A and B cancers (not shown) for both surgical technics were compared and found remarkably similar, a comparison of the survival rates in regard to Stage C cancers of the colon finally revealed the true area of gain in survival. (Fig. 8.) It is evident that death from hepatic metastasis is twice as frequent during the first two years after *conventional* resection, and the

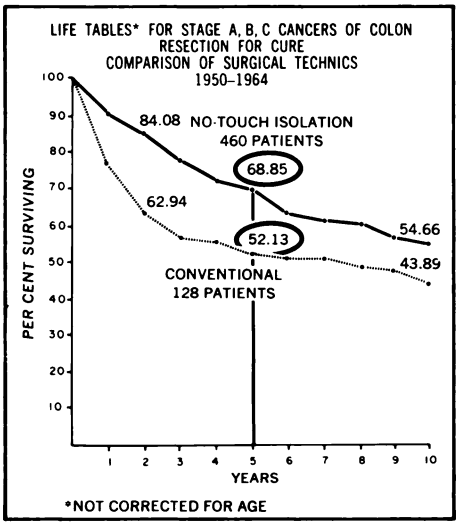

Fig. 7

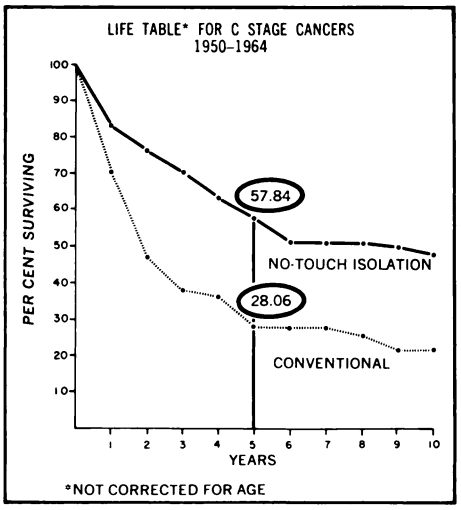

Fig. 8

five-year survival rate of patients with Stage C cancers of the colon has been doubled by using the *no-touch isolation* technic. It is worthy of comment that 90 per cent of Stage C cancers extend into the mesenteric fat as well as metastasize to the mesenteric lymph nodes, making this class of colonic cancer most likely to be disseminated by surgical manipulation at the time of resection.

AGE-ADJUSTED SURVIVAL RATES. Figure 9 shows the age-adjusted (actuarial) survival rate for 460 patients with Stages A, B, and C can-

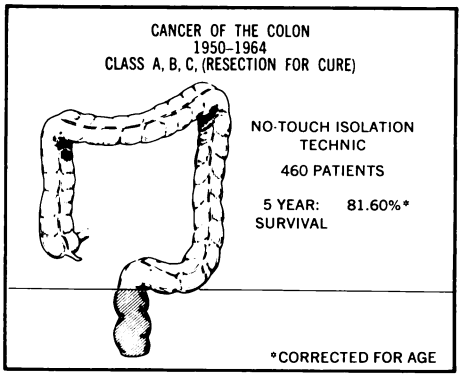

Fig.9. Drawing indicates the age-adjusted five-year survival rate of patients who had Stages A, B, and C cancer of the colon resected for cure.

cers of the colon who underwent "resection for cure," by the *no-touch isolation* method. The operative mortality was 2.2 per cent. The survival rate of 81.6 per cent was found to be constant in regard to the right and left sides of the colon. This high survival rate reflects the greatly increased salvage rate of patients with Stage C cancers of the colon who underwent resection by the *no-touch isolation* technic.

Summary

It has been suggested that operative manipulation of a cancer-bearing segment of colon will increase the incidence of fatal metastasis.

A technic for removal of the cancer-bearing segment referred to as *no-touch isolation* was utilized in 460 patients who underwent "resection for cure." The age-corrected five-year survival rate is 81.6 per cent.

The evidence suggests that the greatly improved survival rates are due to the use of the *no-touch isolation* resection method and that the heretofore conventional manipulative resection technics for cancer of the colon should be abandoned.

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NIHILISM IN THE TREATMENT OF BREAST CANCER

The phrase "biologic predeterminism" has been coined to present an essentially nihilistic view toward the treatment of this cancer: "It make no difference how you find it, when you treat it, or how you treat it when you find it, the result is predetermined by some inner biologic property of the tumor." In carcinoma of the breast nothing could be further from the case. There is a clear correlation of five-year and ten-year survivals with the size of the tumor, and a partial correlation with location and histologic type, but above all with the extent of lymph-node involvement. If one acknowledges that the passage of time is required for a tumor to progress from its initial focus to lymph-node metastasis, the corollary must also be accepted that early diagnosis presents the patient with the greatest likelihood of survival: a localized tumor without spread.

—Francis D. Moore, M.D., et al. "Carcinoma of the Breast: A Decade of New Results with Old Concepts." *New England Journal of Medicine* 277: 293-296, 1967; page 294.