

Management and Survival of Carcinoma of the Colon: Results of a National Survey by the American College of Surgeons

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Survey results of long- and short-term outcome audits of colon cancer in participating hospitals with cancer programs conducted during 1976-7 by the American College of Surgeons are presented. In the long-term audit of 38,621 cases reported by 327 hospitals in 46 states, the overall percentage of cases in localized stage (29.3%) is significantly lower than in the recent series from the National Cancer Institute. The observed survival was substantially lower than the survival rates published in recent smaller series; however, survival approaches the end results for the period 1967-1973. In the short-term audit, the analysis of 11,655 cases diagnosed in 1976 and reported by 491 hospitals from fifty states showed that while 41% of patients had symptoms for less than a month, only 29.5% were diagnosed in the localized stage. Surgery was the predominant treatment modality with an overall resectable rate of 83%. No difference was observed in the stage at diagnosis when the short-term audit (1976) was compared with that found in the long-term audit (1971). The results suggest that the early diagnosis of symptomatic patients may not always substantially improve the cure and survival rate. The screening of asymptomatic patients is suggested as the more promising approach to the substantial improvement of presently less than ideal end results.

ONE OF THE objectives of the Commission on Cancer—American College of Surgeons is to develop criteria for cancer patient care related to diagnosis,

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treatment, rehabilitation and follow up.² To meet this objective, in 1976, the Committee on Patient Care and Research established a policy for all hospitals with an approved cancer program, that cancer committees conduct regularly evaluative studies of diagnostic procedures, management and end results for selected cancer sites. In order to facilitate this process, the Commission decided to assist cancer committees in approved hospitals to utilize the information accumulated in the registries and medical records and through organizing a national survey to provide the participating hospitals with a national average which would offer a more representative picture of management of cancer patients and end results.

Cancer of the colon has been selected in the study for several reasons. It is the second leading malignancy with 102,000 new cases and 52,000 deaths annually.¹ There is a lack of large representative series with end results. In the evaluation of survival studies based on smaller series, there is always difficulty in interpreting the clinical results, primarily because of the lack of uniform or complete definition of terms. Some clinical assessments utilize as the number of cases the following: a) all patients diagnosed, b) all patients subjected to surgery, c) all patients with resection of primary lesions, and d) all patients treated with resection "for cure." The interpretation of survival figures can be further complicated by the lack of consensus for the reporting of the results of treatment. Operative deaths may or may not be deducted from the survivors in such evaluations. Deaths from causes "other than cancer" may or may not be deducted from such clinical

TABLE 1. *The Correlation of Classifications as Used in the "Long-term Audit"*

Extent of Disease Classification	Dukes Classification*
Localized—tumor limited to wall of colon	"A" Case—tumor limited to wall of colon
Regional	"B" Case—extension beyond colon to adjacent structures
a) extension to pericolic fat or adjacent organs	"C" Case—extension to regional nodes
b) extension to regional nodes	Distant—spread to distant organs
Distant—spread to distant organs	

* Dukes, C. E., J. Pathol. Bacteriol., 35:323, 1932.

series. This report describes an assessment of the results of this survey.

Methods

In December 1976, the cancer committees in each of the 742 hospitals with an approved cancer program were invited to voluntary participation in long-term and short-term audit of colon cancer patient care. Detailed audit formats with specific instructions were prepared and forwarded to all hospital committee chairmen.

A. Long-term Audit

The objective of this part of the project was to obtain information on absolute five years survival of colon cancer patients and to evaluate the quality of follow-up. All participating hospitals were asked to report on 100 consecutive patients who received definitive treatment before December 31, 1971. The study was designed to include all histologically confirmed cases regardless of treatment. Specific instructions were given to exclude carcinoma *in situ* in polyps or carcinoma of the rectum. The anatomical limits of the rectum were defined as extending 15 cm proximal to the anal orifice. The categories used for clinical staging of the primary tumor were either localized, regional or distant. The

correlation of the extent of disease with Dukes' original classification is shown in Table 1.

B. Short-term Audit

The short-term evaluation included patients with histologically confirmed cancer of the colon admitted during 1976 who had no prior definitive treatment for this cancer. Patients with carcinoma *in situ* or carcinoma in a pedunculated polyp or carcinoma of the rectum were not included in this study. Hospitals with more than 25 admissions were instructed to include at least 25 consecutive admissions, while hospitals admitting fewer than 25 patients were to include all cases.

Specific questions were asked concerning duration of symptoms prior to admission, reasons for hospitalization, pretreatment examinations, staging, treatment modalities, complications and length of hospitalization. The purpose of this study was to obtain a general picture on a larger scale of the present state of diagnostic and therapeutic approaches in the care of this malignancy, and to ascertain changes, if any, in the trend of staging over the five year period.

Results

A. Long-term Audit

As a result of national voluntary participation there were 38,621 cases reported by 327 hospitals in 46 states. California, New York and Pennsylvania each accounted for over 4,000 cases. The percentage of cases lost to follow-up during the five year period was less than 10%, with some hospitals reporting almost 100% follow-up.

The distribution of cases by part of the colon did not differ substantially from other series.^{3,8} Twenty-nine per cent of tumors occurred in ascending colon, 16% in transverse colon, 9% in descending colon, 44% in sigmoid colon and 2% of cases were reported as multiple sites.

TABLE 2. *The Anatomic Distribution of Colon Cancer as Observed in the "Long-term Audit" Portion of the National Study by Stage*

Part of Colon	Localized		Regional		Distant		All Stages	
	No. of Cases	%	No. of Cases	%	No. of Cases	%	No. of Cases	%
Ascending	3057	27.7	5958	53.9	2032	18.4	11,047	100
Transverse	1755	28.1	3206	51.4	1279	20.5	6240	100
Descending	1012	30.3	1738	52.1	589	17.6	3339	100
Sigmoid	5254	30.7	8257	48.2	3627	21.2	17,138	100
Multiple sites	253	29.5	348	40.6	256	29.9	857	100
Colon Total	11,331	29.3	19,507	50.5	7783	20.2	38,621	100

TABLE 3. *The Five Year Absolute Survival by Anatomic Distribution and by Stage of Cases of Colon Cancer as Observed in the "Long-term Audit" Portion of the National Survey*

Part of Colon	Localized		Regional		Distant		All Stages	
	No. of Cases	%	No. of Cases	%	No. of Cases	%	No. of Cases	%
Ascending	3057	57.4	5958	36.5	2032	2.9	11,047	36.1
Transverse	1755	56.6	3206	36.6	1279	2.7	6240	35.3
Descending	1012	57.1	1738	41.4	589	3.9	3339	39.4
Sigmoid	5254	57.8	8257	36.6	3627	3.2	17,138	35.5
Multiple sites	253	54.6	348	35.1	256	17.2	857	35.4
Colon Total	11,331	57.2	19,507	36.6	7783	3.5	38,621	36.0

The detailed distribution by segment of colon and by stage of disease is shown on Table 2. Again, the lowest percentage of cases with tumor in the ascending colon in localized stage (27.7%) and the highest per cent of localized tumors found in sigmoid colon (30.7%) is not surprising and corresponds with other series.^{3,8} However, the overall proportion of cases in localized stage for the whole colon (29.3%) is significantly lower than in the end results series³ in which 40% of cases were classified as localized.

Table 3 displays the absolute five year survival rate for tumors of the colon by segment of the colon and by stage. All individuals found living (living free of cancer, living with cancer and living cancer status unknown) at the end of five years after diagnosis were included in the survival rates calculations. Detailed breakdown of survivors by cancer status revealed that 82% of cases were free of cancer, 8% were living with cancer while in 10% of cases cancer status was unknown.

B. Short-term Audit

There were 11,655 cases reported by 491 hospitals from 50 states, Washington, D.C. and Puerto Rico. The duration of symptoms prior to admission was less than one month in 41% of the cases, whereas only 15% of the patients were symptomatic more than six

months. The frequency of various reasons for hospitalization is summarized in Table 4, which shows that abdominal pain and bleeding from lower gastrointestinal tract were the most frequent. It is worth noting that in almost one-fifth of the cases the diagnosis was made prior to admission. This should be born in mind when interpreting Table 5, which summarizes the pattern of pretreatment examinations. Nevertheless, these responses indicate that of the routine pretreatment examinations suggested by the American College of Surgeons,⁶ there were two frequent omissions: only 58% of the patients had proctosigmoidoscopy and only 44% of the patients had occult blood exams. The information regarding other selected pretreatment examinations is summarized in Table 6. It is of interest that intravenous pyelogram was performed in only 35% of the cases while more than 50% of tumors might occur near ureters by definition of site of occurrence. Colonoscopy is apparently not in widespread use in some areas as yet. Carcinoembryonic antigen would appear to have been adopted by the surgical community with nearly one-third of the patients receiving the test.

As in other series, surgery has been the predominant method of treatment. As shown in Table 7, surgical resection for cure was performed in 68.5% of cases; another 14.5% had palliative resection for a resectable rate of over 83%. This is comparable to previous re-

TABLE 4. *Stated Reasons for Hospitalization for Treatment of Colon Cancer*

	Number of Cases	% of All 11,655 Cases
Diagnosis of colon cancer prior to admission	2266	19.4
Bleeding from lower GI	3448	29.6
Intra-abdominal mass	1665	14.3
Unexplained diarrhea	1891	16.2
Obstruction of colon	1333	11.4
Unexplained anemia	2075	17.8
Abdominal pain	5459	46.8
Constipation	2362	20.3
Unrelated to cancer	1354	11.6

TABLE 5. *Pretreatment Examinations Performed on Patients with Colon Cancer*

	Number of Cases	% of All 11,655 Cases
Complete history and physical exam	11,201	96.1
Proctosigmoidoscopy	6756	58.0
Chest x-ray	10,962	94.0
Complete blood count	11,402	97.8
Blood chemistry	11,109	95.3
Digital rectal exam	9496	81.5
Barium enema (regular)	9800	84.1
Electrocardiogram	10,618	91.1
Urine exam	11,131	95.5
Stool exam	5187	44.5

TABLE 6. *Special Pretreatment Examinations Performed on Patients with Colon Cancer*

	Number of Cases	% of All 11,655 Cases
Intravenous pyelogram	4175	35.8
Fiberoptic colonoscopy	1409	12.1
Liver scan	4902	42.1
Carcinoembryonic antigen	3557	30.5
Contrast barium enema	1586	13.6
Sonogram	456	3.9

ports in the literature.⁵ Surgery combined with chemotherapy was the most frequent treatment modality reported, (15.2%) followed by chemotherapy alone (2.2%) and surgery and radiation (1.7%). Immunotherapy alone, radiation alone and other combinations were each used in less than 1% of patients.

The complications and mortality of this series of patients is detailed in Table 8, and reveals that despite seventy-five years of surgical experience in colorectal surgery, the mortality and morbidity are still quite significant. This is most probably related to the age and general status of these patients, as documented by frequent occurrence of cardiovascular and pulmonary complications.

Thirty per cent of patients were discharged in less than 14 days, while 17% of patients were hospitalized for more than thirty days. Interestingly, detailed analysis of length of stay revealed that, in general, length of hospitalization is shorter in smaller hospitals with less than 200 beds. This finding was not related to the stage of disease.

The distribution of cases by stage of disease is summarized in Table 9. It shows, when compared with Table 2, that between the years 1971 and 1976, there was no change in the proportion of localized cases at the time of diagnosis.

TABLE 7. *The Type of Primary Surgical Treatment Performed in Reported Cases of Colon Cancer*

	Number of Cases	% of All 11,655 Cases
1. Exploratory procedure	286	2.4
2. Curative resection		
A. One stage	6,600	56.6
B. Two stage	963	8.3
C. Three stage	426	3.7
3. Palliative procedure		
A. Bypass	158	1.3
B. Colostomy only	566	4.9
C. Palliative resection	1,691	14.5
4. No surgery	649	5.6
5. Type of surgery not specified	316	2.7
Total	11,655	100.0

TABLE 8. *Reported Complications and Mortality in Operative Cases of Colon Cancer*

	Number of Cases	% of All 11,655 Cases
Death following surgery	765	6.6
Death—no surgery	241	2.1
Wound infection	812	7.0
Anastomatic leak	134	1.1
Wound dehiscence	176	1.5
Fistula	232	2.0
Intestinal obstruction	458	3.9
Intra-abdominal abscess	313	2.7
Urinary tract infection	582	5.0
Pulmonary complications	916	7.8
Cardiac complications	954	8.2
Cerebrovascular complications	159	1.4
Phlebotrombosis	140	1.2
Intra-abdominal hemorrhage	100	0.9

Discussion

The remarkable response and completeness of the data provided in a relatively short time-period is a tribute to the cancer committees and tumor registrars in all participating hospitals. The data presented in this report seem to reflect more realistically the present situation in diagnosis, treatment and end results of colon cancer. Despite the possible variation between so many hospitals, both series are large enough to be considered of value for future comparisons.

The classification system used (localized, regional and distant) is well known to most registrars and has been consistently used for end results reporting.^{3,8}

In view of these factors, the findings of only 29.3% of cases in localized stage is surprising and in a strong contrast with the 40% localized cases reported in end results series.³ However, the overall percentage of cases classified as distant is lower than reported by others.^{3,8} These differences indicate that more than 70% of colonic tumors are diagnosed as rather advanced lesions and to a great extent explain the less than optimal survival results. It should be born in mind,

TABLE 9. *The Stage of Colon Cancer Cases Surveyed in the "Short-term Audit"*

	Number of Cases	% of All 11,655 Cases
Localized	3,434	29.5
Regional		
A. To pericolic fat or adjacent tissue	2,496	21.4
B. To regional lymph nodes	1,295	11.1
C. To both A and B	1,766	15.2
Distant	2,506	21.5
Stage not known	158	1.3
All stages	11,655	100.0

however, that survival rates for localized as well as regional lesions in this series were also substantially lower than in series reported previously;^{3,8} however, they do correspond with end results series for the period of 1967–1973. It would seem that the generally accepted concept that a surgical procedure always offers a significant benefit to patients with localized disease is not necessarily supported by the results of this survey.

Another finding of interest is a relatively large proportion of patients with less than a month duration of symptoms (41%) when compared with proportion of cases with localized lesions (29.3%). It would seem less certain that the early diagnosis of symptomatic patients will result in a significant increase of cure and survival rates. These results are in agreement with those of Copeland⁴ and Slaney⁷ who were unable to find any evidence of improved survival in patients with carcinoma of the colon presenting with a short history of symptoms. Under these circumstances, the screen-

ing of asymptomatic population at high risk of developing the disease seems at present the most promising solution.

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