



Carcinoma of the Colon, Rectum, and Anus

ROBERT FRANKLIN, M.D., BARTON McSWAIN, M.D.

*From the Departments of Surgery and Pathology, Vanderbilt University
School of Medicine, Nashville, Tennessee*

IN the Vanderbilt University Hospital from 1925 through 1968, 1,022 patients with carcinoma of the colon, rectum, or anus have been operated upon. Previous reports were published in 1955² (252 patients) and in 1962¹ (708 patients). The purpose of the present study was to determine whether or not in the recent period (1961 through 1968) there had been any change in frequency, site incidence, delay from initial symptoms until diagnosis, extent of the carcinoma, percentage of patients with polyps, percentage of patients with synchronous and metachronous carcinomas, and resectability, and to determine the survival rates in the 769 patients seen from 1925 through 1963.

Relative Frequency

Annual. In 1961–1968, compared with 1949–1960, the annual number of carcinomas increased from 38.0 to 39.3, although the number per admission decreased somewhat (Tables 1 and 2).

Site. Carcinoma of the rectum and anus decreased from 54.6% in 1925–1948 to 23.2% in 1961–1968, whereas carcinoma in the colon other than the rectum and anus increased from 45.4 to 76.8% (Table 3). In the first two periods (1925–1960), there were 16 carcinomas of the anus, and in the final period (1961–1968), there were six. The location of the 1,022 carcinomas is shown in Figure 1.

Age. The ages for three periods are shown in Figures 2 and 3. There was a higher percentage of older patients (seventh through tenth decades) in the most recent period.

Sex. From 1925 through 1960 there were 347 males (49%) and 361 females (51%), and from 1961 through 1968 there were 134 males (43%) and 180 females (57%) as shown in Table 4. In the latter period there were 32 females and 35 males who had carcinomas of the rectum and anus, but 148 females and only 99 males had carcinomas elsewhere in the large bowel.

Race. From 1925 through 1960 the ratio of Caucasians to Negroes with such cancers

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was 9 to 1, and in 1961-1968 it was about 5 to 1 (Table 5). The ratio of admissions of Caucasians to Negroes was approximately 9 to 1 in the earlier periods and 5 to 1 in the most recent period.

Duration of Symptoms

Figure 4 shows the delay in treatment from onset of symptoms during four periods, such delay being because of the patients' procrastination and the physicians' failure to make the diagnosis. There was a considerable drop from the 1925-1948 period (5.6 months by patient and 5.8 months by physician) to the 1956-1960 period (3.0 months and 2.3 months). However, in the most recent period (1961-1968) the delay by the patient was the same (3.0), whereas the delay by the physician was a little longer (2.5).

Diagnostic Procedures

Table 6 shows the percentage of patients with tumors palpable on abdominal

TABLE 1. Annual Frequency of Carcinoma of the Colon, Rectum and Anus

Period	Number of Patients	Patients Per Year
1926-1948	252	10.5
1949-1960	456	38.0
1961-1968	314	39.3

TABLE 2. Colon Carcinoma Per Hospital Admission

1925-1948	1:737
1949-1960	1:305
1961-1968	1:369

TABLE 3. Site—Per cent

Period	Right	Left	Rectum and Anus
1925-1948	20.0	25.4	54.6
1949-1960	27.4	39.0	33.6
1961-1968	31.4	45.4	23.2

TABLE 4. Sex

	1925-1960	1961-1968
Males	347 (49%)	134 (43%)
Females	361 (51%)	180 (57%)

TABLE 5. Race—Per cent

	Caucasian	Negro
1925-1960	90	10
1961-1968	82	16

or digital rectal examination or visible through the sigmoidoscope. In the first period, over half of the carcinomas could be felt on digital examination, and nearly two thirds could be found by digital plus sigmoidoscopic examination. Because of the relative decrease in carcinomas of the rectum with relative increase in carcinomas of more proximal sites, in the most recent

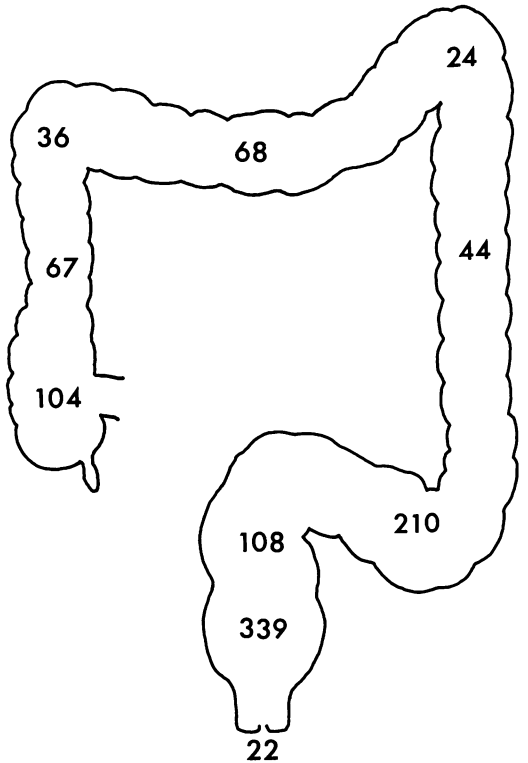


FIG. 1. Location of 1,022 cases of carcinoma of the colon, rectum and anus.

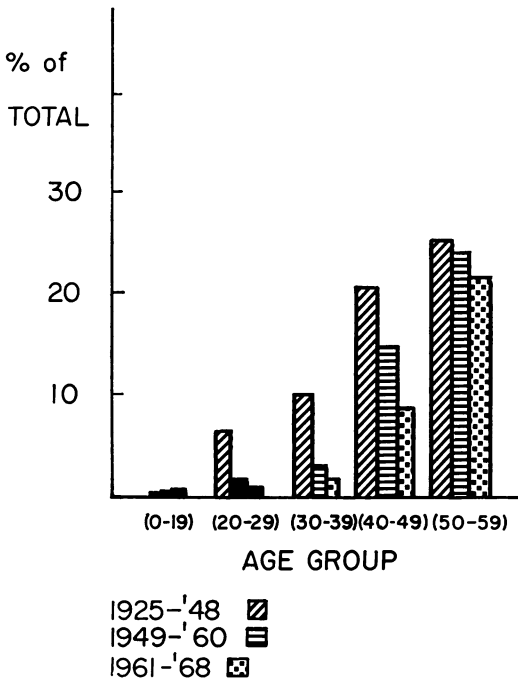


FIG. 2. Percentage of patients in younger age groups for three periods.

period only one fourth could be felt on rectal examination and less than half could be found by digital plus sigmoidoscopic examination.

In the most recent period, on barium enema x-ray the correct diagnosis was made in 100% of patients with carcinomas of the right colon except for the cecum where it was 91%, 100% in the left colon, and 70% in the rectum.

TABLE 6. Per Cent of Carcinomas Diagnosed By Physical Examination

Method	1925-1948	1925-1960	1961-1968
Abdominal	24	25	18
Digital	54	36	27
Digital and sigmoidoscopic	62	55	45
Abdominal + digital and sigmoidoscopic	86	80	63

TABLE 7. Mistaken Diagnoses 1961-1968

	Number Patients	Per Cent of Mistaken Diagnoses
Hemorrhoids	21	28
Diverticulosis (or itis)	12	16.6
Peptic ulcer	9	12.5
Appendicitis	6	8.3
Hematological problem	5	7.0
Gallbladder disease	4	5.5
Spastic colon	4	
Total	61	

There were 11 other erroneous diagnoses (see text).

Erroneous Diagnoses

In 1961-1968, erroneous diagnoses were made in 72 (23%) of the 314 patients after gastrointestinal symptoms had started. These were not tentative diagnoses by general practitioners but most of the patients were in the hospital being "worked up" under mistaken diagnoses. The erroneous diagnoses in 61 of the 72 are shown in Table 7. Other mistaken diagnoses were benign hypertrophy of the prostate in three patients, and, in six, ovarian cyst, hiatal hernia, pancreatitis, liver disease, menorrhagia, and tropical sprue. Seven of the 72 patients had been subjected to the following operations: Hemorrhoidectomy (three), operation for appendicitis (three), and repair of hiatal hernia (one).

TABLE 8. Spread

Period	No. Patients	Per Cent of Patients		
		Through Muscularis	Metastasis to Nodes	No Spread
1925-1948	171	13	37	50
1958-1964	200	37.5	47	15.5
1965-1968	172	41	39	20

TABLE 9. *Resectability*

Period	Per Cent
1925-1940	50.1
1941-1960	80.0
1961-1968	94.2

TABLE 10. *Resectability*
1961-1968

Site	Per Cent
Right	94.6
Left	95.6
Rectum and anus	93.0
Total	94.2

Extent of Lesion

Table 8 shows the extent of lesions in three test periods, considering whether or not there was extension through the muscularis and into lymph nodes. In the ear-

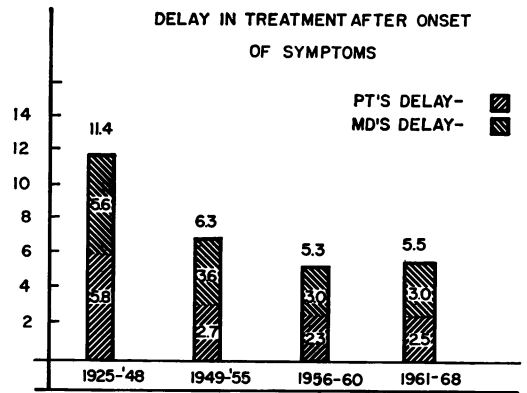


FIG. 4. Delay in treatment after onset of symptoms.

liest period, there was no spread in 50% of patients, whereas there was no spread in only 15.5% in the second period. There was some improvement in the most recent period, 20% showing no spread. In that period, there was a higher percentage with spread through the muscularis (41% compared to 37.5%), but a lower percentage of lymph node involvement (39% compared to 47%). The fact that the carcinomas were more advanced in later periods is not because patients were operated upon when symptoms were of longer duration. Either carcinomas of these sites spread more rapidly than formerly or more thorough examinations of specimens have been made in recent years.

Resectability

The percentage of resectable lesions improved in each period (Table 9), being 50.1, 80.0, and 94.2%. Whether this was because the tumors were less extensive in later years or because surgeons removed lesions previously considered unresectable is not known. The data in Table 8 indicate that the latter factor is the cause of the improvement. Table 10 shows resectability for the 1961-1968 period for the three sites. It was approximately 95% for all three.

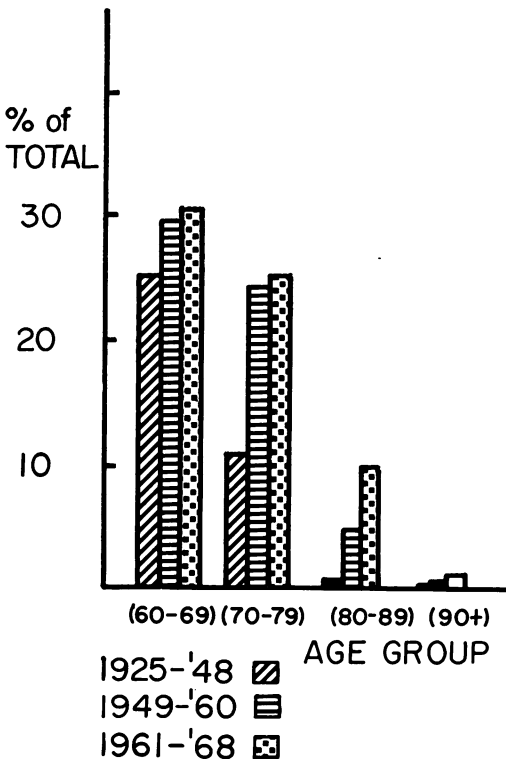


FIG. 3. Percentage of patients in older age groups for three periods.

TABLE 11. *Metachronous and Synchronous Carcinoma and Polyps in Two Periods Per Cent*

	1925-1960	1961-1969
Metachronous	2	2.9
Synchronous	4.0	5.4
Polyps	7	24.4

TABLE 12. *Per Cent of Patients with Metachronous and Synchronous Carcinoma and Polyps in Recent Period*

	1961-1968
Metachronous	2.9
Synchronous	5.4
Polyps	24.4
Total	32.7

Operative Mortality

The operative mortality dropped from a high of 25% in 1925-1940 to a low of 4.3% in 1955-1960 and increased slightly (4.8%) in the final period.

Six of 15 postoperative deaths followed emergency operations. In five there was obstruction: Total colectomies were done for carcinoma of the sigmoid and appendix, and right colectomies for carcinoma of the cecum. In three patients with obstructions, colostomies only were done for carcinomas of the transverse colon, the splenic flexure, and the sigmoid. In the sixth patient, exteriorization was done for a perforated carcinoma of the sigmoid.

Polyps, Synchronous and Metachronous Carcinomas

From 1925 through 1960, 2% of patients had separate carcinomas of the colon or rectum before or after the original operation. The percent for 1961-1968 was 2.9 (Table 11). In the earlier period, 4% had synchronous carcinomas, and in the most recent period, 5.4% (17 patients, nine of whom had polyps also). In 1925-1960, polyps were found in only 7% of patients with carcinoma, whereas they were found

TABLE 13. *Five Year Survival 1956-1963*

	Per Cent
Carcinoma in nodes and through muscle	13
Carcinoma in nodes (with or without extension through muscle)	16
Carcinoma in nodes (not through muscle)	43
No carcinoma in nodes, but through muscle	56
No carcinoma in nodes or through muscle	71.6
Overall	40.2

TABLE 14. *Five Year Survival By Site in Two Periods*

Period	Right Colon	Left Colon	Rectum and Anus
1925-1955	40.0%	37.9%	31.3%
1956-1963	46.1%	38.6%	36.2%

in nearly one fourth in the latter period. In the latter period, metachronous carcinomas (2.9%), synchronous carcinomas (5.4%), or polyps (24.4%) were found in nearly one third of patients (Table 12). In the most recent period, 19 (6.1%) of 314 patients had microscopic evidence of carcinoma in polyps. All 19 patients are alive.

Total Colectomy

In five patients excision of all the colon except the rectum was performed. All were done in 1961-1968. One died in the post-operative period; the other four are alive. The indications were: Carcinoma of the cecum and sigmoid (two), carcinoma of the sigmoid and appendix (died), carci-

TABLE 15. *Five Year Survival By Site and Sex 1956-1963*

Site	No. Patients	Sex	No. Survived	%
Right	89	32 males	15	47
		57 females	25	44
Left	138	59 males	10	17
		79 females	38	48
Rectum and anus	79	40 males	17	42
		39 females	16	41

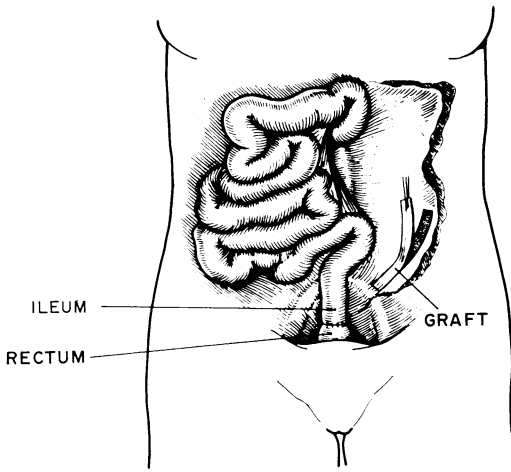


FIG. 5. Removal of free graft of peritoneum for jejunorectal anastomosis.

noma of the hepatic flexure with multiple polyps, and carcinoma of the descending colon with multiple polyps.

Nearly one fourth of patients in the 1961-1968 period had either synchronous or metachronous carcinomas or polyps. Subtotal colectomy without proctectomy would have prevented the subsequent carcinoma or polyps except in the rectum. We do not advocate this procedure routinely, but we do advise it in two situations: one in carcinomas in both right and left sides of the colon, and in patients with carcinoma of one side of the colon and polyps in the other side.

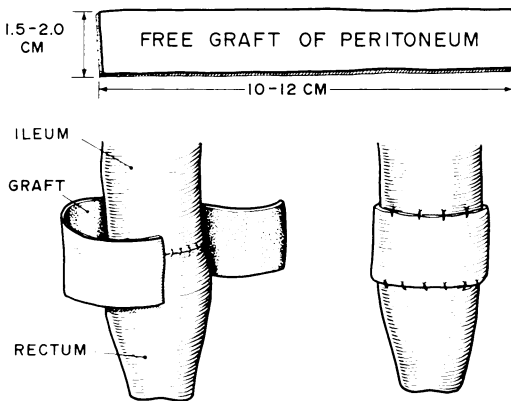


FIG. 6. Suturing of graft to anastomosis.

After total colectomy without proctectomy when there is no omentum to wrap around the anastomosis a 1.5 to 2 cm. strip of parietal peritoneum from the left lower quadrant is used for this purpose (Figs. 5 and 6). The free graft is sutured at a half dozen points, care being taken that it does not constrict the suture line.

Results

Recurrences. Of the 306 patients operated upon from 1956 through 1963, 7 (2.3%) had recurrences at the suture line. Of these, carcinomas were in the rectosigmoid area in four patients, the sigmoid in two, and the transverse colon in one. Before resection, tapes were placed around the bowel in only one of these seven patients. In that one, the proximal tape was placed early in the operation but, as it was a low rectosigmoid lesion, some dissection had to be done before the distal tape could be applied.

Per Cent of Follow-up. On December 31, 1968, 769 of the 1,022 patients had been operated upon 5 or more years previously. All but eight (96.7%) of 239 patient operated upon from 1925-1948 and all 530 patients operated upon from 1949 through 1963 were followed.

Survival Rates. Figure 7 shows the absolute 5-year survival for four periods. In 1925-1940, it was 17%, 37% in 1941-1948,

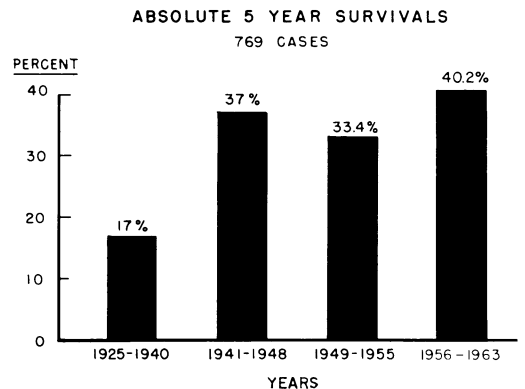


FIG. 7. Absolute 5-year survival for four periods.

33.4 in 1949–1955, and 40.2% in 1956–1963. In the latter period, in patients who had so-called “curative” resections, it was 56.4%. Since operative mortality was slightly higher in the final than in the preceding period, 5-year survival is higher even when corrected for operative mortality.

From 1956 through 1963, 5-year survival rate was 3.7 in 84 patients who had extensions of cancer to other viscera, 53 had hepatic metastases. Table 13 shows results in different stages of carcinoma. In patients with carcinoma in nodes and through the muscle, 5-year survival was 13%. In patients with carcinoma in nodes with or without extension through the muscle, survival was 16%. If carcinoma was in nodes but not through muscle, survival was 43%, and if it was through muscle but not in nodes, it was 56%. In 74 patients who had no carcinoma in nodes or through muscle, survival was 71.6%.

Five-year survival rate according to site for two periods is shown in Table 14. As is usually the case, survival rate is highest in lesions of the right colon and lowest in the rectum. There was steady increase in 5-year survivals in carcinoma of all three sites. Table 15 shows 5-year survival for

1956–1963 according to site and to sex. There is no explanation for the low survival rate (17%) in males with carcinoma of the left colon. In the 1956–1963 period, one of three patients with carcinomas of the anus survived more than 5 years.

Summary

Findings in 1,022 patients with carcinomas of the colon, rectum, and anus, and results of follow-up of 5 or more years in 761 are reported.

Conclusions

Over a period of more than 40 years (1925–1968), a study of carcinoma of the colon, rectum, and anus shows that there has been a relative decrease in incidence of carcinoma of the rectum with a relative increase in carcinomas elsewhere in the large bowel. There has been an increase in resectability rate, a decrease in operative mortality, and in, 1956–1963, an increase in 5-year survival.

References

1. McSwain, B., Sadler, R. N. and Main, F. B.: Carcinoma of the Colon, Rectum and Anus. *Ann. Surg.*, 155:782, 1962.
2. Sadler, R. N. and McSwain, B.: Carcinoma of the Colon, Rectum and Anus. *Amer. Surg.*, 21:975, 1955.

DISCUSSION

DR. JONATHAN RHOADS (Philadelphia): The figures which come from Nashville are so extraordinarily similar to our own that it is almost unbelievable. Within a few tenths of a percentage point we would agree on the metachronous multiple carcinomas, and so forth.

I rise chiefly to stress the fact that when these tumors are fixed, one shouldn't give up on them. As was mentioned by Dr. McSwain, if you *can* take them out, take them out.

Dr. Leonard Miller, Dr. Irving Boruchow, and Dr. William T. Fitts, Jr. went over our material, some 1,100 cases, and took from it 284 in which there was fixation. In 213 there was simple fixation;

in about 43 there was abscess formation; and in about 21, fistula; and in 7, a free perforation.

Of those in which there was apparent fixation, but not abscess, fistula or free perforation, slightly less than half, actually, showed microscopic invasion at the site of attachment to the other organ.

The results in these cases, considered as a group, were 25.7% of 5-year survival, which is less than, of course, the average for the more favorable cases, but compares fairly well with the over-all average if one considers the total 5-year survivors with the total number of patients with carcinoma who come to an institution, operable and inoperable.