The introduction of emergency partial gastrectomy for bleeding ulcer has not lowered the overall mortality, but nevertheless there are good reasons for undertaking it in selected cases.

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RESULTS OF SURGERY IN TREATMENT OF CANCER OF THE LARGE INTESTINE

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In recent years the attitude of surgeons towards cancer of the large bowel has become increasingly more aggressive. Formerly a large proportion of the patients suffering from this disease were regarded as inoperable, and if, as was often the case, the growth lay in the rectum or distal colon they were treated by colostomy alone. Experience has shown, however, that a simple colostomy of this kind seldom afforded any real palliation, and all too often its only effect was to add the inconveniences of an artificial anus to the patient's existing discomforts. Though it overcame any obstructive element it did little to allay the other distressing features of an inoperable growth—the incessant spurious diarrhoea with discharge of slime and blood, the occasional profuse and alarming haemorrhages, the severe sacral or sciatic pain, and the development of fistulae into other organs or externally. This is not surprising, for these symptoms all spring directly from the continued presence of the growth in the bowel and can only be obviated by its removal. It is therefore clearly desirable, where possible in treating cancer of the large bowel, to excise the primary growth for palliative purposes alone quite apart from any question of cure.

Fortunately, despite their well-known predilection to become fixed to adjacent organs or to the pelvic or abdominal walls, carcinomata of the rectum or colon can generally be excised by a really determined operation, comprising, if necessary, resection of implicated adjoining viscera or parietes. Pathological examination of the operating specimens thus secured shows that the binding adhesions often contain no actual growth but are purely inflammatory in character, so that the prognosis is frequently much better than was anticipated at the time of operation, and an excision which was undertaken essentially for palliation sometimes turns out to be curative. Even if the growth should eventually reassert itself the patient may often enjoy two or three years of comfortable and useful life before this occurs. There is thus everything to be said for excision if at all possible, and indeed with almost no other form of malignant disease does really extensive surgery pay such handsome dividends as it does with cancer of the large bowel.

In his pursuit of this more ruthless policy the surgeon is, of course, much assisted by the greatly enhanced safety of surgery since the end of the second world war, due to better blood-transfusion facilities, improved anaesthesia, a clearer understanding of the problem of fluid and electrolyte balance, and the advent of antibiotics for systemic and intestinal use. As a consequence there must now be few patients, even amongst the elderly frail individuals who represent such a large proportion of the sufferers from cancer of the large

Three leprosy clinics have been opened in Sokoto Province, Northern Nigeria, by Dr. C. M. Ross, Senior Specialist in Leprosy for the Northern Region. Discharge certificates were recently presented to 23 people in the province who had been examined and found free from leprosy. These are the first discharges in the province, and are an indication of the amount of control which is now being gained over the disease. The Minister of Health for the region has recently announced plans for the building of a leprosy training school at Kaduna to continue the fight against the disease.

bowel, who cannot be made justifiable risks for an excision operation. Thus Allen (1950), of Boston, has recorded a resectability rate of 95%, and an immediate operative mortality of only 2.7% in a series of 195 cases of carcinoma of the colon and rectum treated at the Massachusetts General Hospital; and Naunton Morgan (1955) in this country has reported a resectability rate of 94% and an immediate mortality of only 4.3% in a series of 477 cases of rectal cancer treated at St. Mark's, St. Bartholomew's, and other hospitals.

It is to be presumed that similar trends have characterized the care of cancer of the rectum and colon in the hands of the average general surgeon throughout the country, but we have been unable to discover any extensive published data to support this supposition. It seemed to us that it would be interesting to determine whether the management of cancer of the large bowel has undergone any significant improvement during the past 20 years in a large teaching hospital where the patients suffering from this disease are shared among several general surgical "firms." We have recently attempted to secure such information from the Leeds General Infirmary, where this state of affairs has obtained. For this purpose we have analysed and compared, with special reference to the treatment and mortality, the clinical notes of two groups of cases of carcinoma of the rectum and colon. The first group represented all the patients admitted to the Infirmary with these diseases during the years 1938-43 inclusive, and comprised 485 cases; the second one included all the patients similarly admitted during the years 1947-55 inclusive and totalled 1,159 cases. We believe that the survey of these patients is instructive in another way, for the Leeds General Infirmary, unlike some other teaching hospitals, still functions as the main regional hospital of its area. Its clinical material therefore gives a fairly accurate picture of the relative frequency and common modes of appearance of various diseases. For that reason the opportunity has been taken to elicit from this fairly large combined series of 1,644 cases of cancer of the large bowel certain facts regarding the incidence and manner of presentation of this condition.

Site Incidence of Growths in the Large Bowel

The distribution of the carcinomata in the rectum and colon in the two series and collectively is shown in Table I. It will be seen that there is no essential difference in the incidence in the two periods under review. The frequency

TABLE I.—*Distribution of Carcinomata in Various Parts of Large Intestine*

Site	Percentage of Growths in Each Site		
	1938-43 Series (485 Cases Analysed)	1947-55 Series (1,159 Cases Analysed)	Combined Series (1,644 Cases Analysed)
Rectum	61.5	55.7	57.4
Sigmoid colon ..	21	21.4	21.3
Descending ..	2.9	2.7	2.7
Splenic flexure ..	2.7	3.2	3.0
Transverse colon ..	4.6	4.7	4.7
Hepatic flexure ..	1.0	2.1	1.8
Ascending colon ..	1.6	3.5	2.9
Caecum	4.7	6.7	6.1

of growths in different parts of the colon is also very similar to that reported by previous writers, such as Fraser (1938) and Judd (1924), but, unlike the cases referred to by them, the present series includes carcinomata of the rectum and thus reveals the site incidence of malignant disease in the entire large intestine. It will be seen that 57.4% of the growths in the combined series of 1,644 cases lay in the

rectum, and that of the 42.6% of growths in the colon proper exactly half occurred in the sigmoid region. This indicates the enormously increased liability to malignant disease in the distal part of the large bowel, and is important from the diagnostic point of view, for it means that 78.7%, or approximately four-fifths, of the sufferers from bowel cancer have their lesions in a situation which can in most cases be reached directly by the finger or the sigmoidoscope.

The remaining 21.3% of carcinomata in the colon were distributed over the other parts of the large intestine in the following order of frequency: caecum, transverse colon, splenic flexure, ascending and descending colon, and hepatic flexure. But even in the caecum the incidence amounted to only 6.1%.

Sex Incidence

The distribution of the carcinomata at different sites in the two sexes in the combined series is shown in Table II. It will be seen that altogether 907 of the patients were men and

TABLE II.—*Relative Numbers of Growths in the Two Sexes at Different Parts of Bowel in Combined Series of 1,644 Cases*

Site	No. of Patients with Growths in Each Site	
	Males	Females
Rectum	559	385
Sigmoid colon ..	176	174
Descending ..	18	27
Splenic flexure ..	25	25
Transverse colon ..	37	40
Hepatic flexure ..	20	9
Ascending colon ..	24	24
Caecum	48	53
All sites	907	737

737 women, but that this slight male preponderance is explained entirely by the higher incidence of cancer of the rectum in men than in women—the proportion in this site being 559 men to 385 women. Elsewhere the incidence in the two series was approximately equal.

Mode of Presentation

Broadly speaking, there were three ways in which these 1,644 patients presented at hospital with malignant disease of the large intestine.

As Non-acute Cases at the Out-patient Clinics.—The great majority of the patients were referred to the out-patient clinics or consulting-rooms with an obvious carcinoma of the rectum or colon or with suggestive symptoms requiring further investigation, and were admitted to hospital in due course as non-urgent cases with a view to radical or palliative treatment.

As Emergency Cases with Acute Intestinal Obstruction.—A much smaller proportion of the cases were admitted as emergencies with symptoms of acute intestinal obstruction. Roughly two-thirds of these had had, for some weeks or months prior to the onset of these acute symptoms, other complaints referable to their growth, but their significance had not been appreciated by the patient or his doctor. It was therefore essentially on account of the acute obstruction that the patient was admitted to hospital, and the relief of obstruction was the prime essential in treatment.

As Emergency Cases with General or Localized Peritonitis Due to Perforation of Colon.—A still smaller percentage of the patients were admitted urgently with a local or general peritonitis due to perforation of the colon either through a stercoral ulcer some distance proximal to an obstructing growth, and often in the caecum, or, much more commonly, at the site of the carcinoma itself.

The proportion of patients in these three categories was roughly the same during the two periods under review. Of the combined series of 1,644 cases, 1,239 (75.2%) were admitted as non-urgent cases, 290 (18%) as emergencies with acute intestinal obstruction, and 115 (6.8%) as emergencies with perforation and peritonitis.

Results of Treatment

Our ultimate aim in this survey was to determine the proportion of patients in the two series who were given the benefit of a radical operation and the number who survived this operation. But first of all it is instructive to review the initial management of the cases admitted with acute obstruction or perforation of the bowel and see if, with our better knowledge of fluid and electrolyte balance and the use of antibiotics, there has been any improvement in the results of treatment of these emergencies in recent years.

Cases With Acute Obstruction

Nine of the patients with acute obstruction were virtually moribund on admission and never rallied sufficiently for an operation of any kind to be performed before they died. In 15 other cases the only treatment employed for the obstruction was enemata, which were successful in 14. The remaining patients were subjected to operation, which usually took the form of a decompression or a short circuit, leaving the neoplasm *in situ*, but in a few instances involved a resection of the growth by an intraperitoneal technique with sutured anastomosis, or a Paul-Mikulicz type of operation. The various measures employed in these obstructed cases in the two series and the resulting immediate mortality are listed in Table III.

TABLE III.—*Immediate Treatment of Acutely Obstructed Carcinoma of Large Intestine*

Forms of Treatment Employed	1938-43		1947-55	
	No. of Cases Treated	No. of Hospital Deaths	No. of Cases Treated	No. of Hospital Deaths
Expectant	5	5	4	4
Enemata alone	1	0	14	1
Caecostomy	24	12	54	24
Colostomy, transverse or iliac	14	8	68	11
Ileo-transverse colostomy ..	0	0	31	3
Primary resection:				
Right hemicolectomy with anastomosis ..	1	0	16	1
Other forms of anastomosis	0	0	7	2
By Paul-Mikulicz method ..	10	3	24	6
Mikulicz method ..	4	4	13	2
Miscellaneous operations ..				
All forms of treatment	59	32 (54%)	231	54 (23.4%)

It will be seen that the immediate mortality of acutely obstructed carcinomata has declined from 54% during 1938-43 to 23.4% during 1947-55. Some of this improvement may be attributable to the relatively less frequent use, during the latter period, of caecostomy, which appears from this analysis to be a particularly hazardous operation, often followed by fatal sepsis. Another factor which may have been of importance was the better control of fluid and electrolyte balance and the availability of antibiotics during the second period. Incidentally, it is interesting to note that the number of deaths following primary resection—that is, right hemicolectomy, colectomy at other sites with intraperitoneal anastomosis, or Paul-Mikulicz resections—in 58 of these obstructed cases was not as great as might have been feared—being only 12 (20.6%), the majority occurring after operations of the Paul-Mikulicz type.

Cases With Perforation and Peritonitis

Many of these patients were desperately ill on admission and rapidly died; included in this group were most of the 20 patients with a diastatic perforation, usually of the caecum, proximal to an obstructing carcinoma of the left colon. A certain number of the others were treated by laparotomy, suture of the perforation, and the establishment of a proximal colostomy or caecostomy. In a few cases the perforation was exteriorized as a colostomy, or a resection of the perforated growth was performed. The frequency with which these various methods of treatment were used and the immediate results are indicated in

TABLE IV.—*Immediate Treatment of Carcinomata of Large Bowel Complicated by Perforation and Peritonitis*

	1938-43		1947-55	
	No. of Cases Submitted to it	No. of Hospital Deaths	No. of Cases Submitted to it	No. of Hospital Deaths
Expectant	11	11	23	23
Drainage only	1	1	1	1
Suture of perforation together with colostomy or caecostomy	25	19	32	25
Primary resection (right hemicolectomy or Paul's resection)	6	2	16	3
All forms of treatment	43	33 (76.7%)	72	52 (72%)

Table IV. The mortality remained approximately the same in the two groups, being 76.7% during the first and 72% during the second. It will be seen that the best results were obtained by primary resection of the perforation and growth where their relative proximity made this possible.

Cases Proceeding to Radical Excision

Altogether 765 (48.4%) of the 1,644 cases were eventually submitted to radical operation, but there was a considerable difference in the resectability rate during the two periods under review. Thus radical excision was carried out in only 127 (26.2%) of the 485 patients seen during the years 1938-43, but 638 (55%) of the 1,159 patients treated during 1947-55 proceeded to excision of the primary tumour.

Influence of Mode of Presentation of Disease on Ultimate Resectability.—Most of the patients proceeding to resection during both periods under review were derived from the group of cases presenting non-acutely. The proportion of patients eventually achieving resection in the groups with acute obstruction or perforation was much less, partly owing to the smaller size of these groups and partly on account of the rather lower resectability of growths which have been complicated in these ways. Thus of the 1,239 patients presenting non-urgently at the out-patient clinics, 631 (50%) were submitted to resection. By contrast, only 124 (43%) of the 290 cases with acute obstruction and 22 (19%) of the 115 with perforation and peritonitis eventually proceeded to resection.

Influence of Site of Growth on Operability Rate.—If the resectability rate is related to the site of the growth in the two periods under review, as in Table V, the interesting fact

TABLE V.—*Influence of Site of Growth on Resectability Rate of Carcinoma of Large Intestine*

Site of Growth	1938-43			1947-55		
	No. of Cases Seen with Growths in this Site	No. Deemed Resectable	Resectability Rate	No. of Cases Seen with Growths in this Site	No. Deemed Resectable	Resectability Rate
Rectum ..	298	47	15.7%	646	363	56.2%
Sigmoid ..	102	35	34.3%	248	118	47.5%
Descending colon ..	14	8	57.1%	31	26	83.9%
Splenic flexure ..	13	4	30.8%	37	19	51.4%
Transverse colon ..	22	11	50.0%	55	33	60.0%
Hepatic flexure ..	5	3	60.0%	24	14	58.3%
Ascending colon ..	8	7	87.5%	40	20	50.0%
Caecum ..	23	12	52.2%	78	45	57.7%
All sites	485	127	26.2%	1,159	638	55.0%

emerges that the rise in resectability in the second period is due almost entirely to the more radical management of carcinomata in the rectum and sigmoid colon. In the first period few of these lesions were removed, but during the second an increasing proportion have been subjected to excision each year. For growths elsewhere in the colon, and

especially those on the right side, there has been little change in the resectability rate, which actually has been fairly high throughout.

Influence of Rise in Resectability Rate on Mortality of Radical Operations.—This increase in the proportion of patients proceeding to radical operation in the post-war period would be a very hollow achievement if it were accomplished at the expense of a considerable rise in the operative mortality. In fact, the number of operative deaths following radical operation in the 1938–43 period was 24 out of a total of 127 radical operations, which gives an operative mortality of 18.8%, whilst the number of immediate deaths in the 638 patients proceeding to resection in the 1947–55 period was 71, giving an operative mortality rate of 11.1%. The mortality rate has thus actually fallen despite the increased operability in this latter period, the effect being that a much greater proportion of patients have left the hospital with a chance of cure during 1947–55 than during the 1938–43 period (see Table VI).

TABLE VI.—Proportion of Patients Leaving Hospital Alive After Radical Operation for Carcinoma of Large Bowel

	1938–43	1949–55
No. of patients seen	485	1,159
No. of patients treated by radical operation	127 (26.2%)	638 (55%)
No. of patients leaving hospital alive after radical operation (includes some palliative excisions)	110 (23%)	589 (51%)

Choice of Radical Operation.—The various types of radical operation employed in both these series of cases are listed in Table VII. As would be expected from the increasing resectability of rectal and sigmoid cancer in the latter years revealed in Table V, many more rectal excisions have been performed during the 1947–53 period than in the previous period. In addition, it will be noted that the perineal or sacral type of operation, which was previously in vogue for excision of the rectum, has given way largely to the combined abdomino-perineal excision.

TABLE VII.—Types of Radical Operation Used in Treatment of Carcinoma of Large Intestine

Type of Operation Performed	1938–43		1947–55	
	No. of Times Used	No. of Hospital Deaths	No. of Times Used	No. of Hospital Deaths
Right hemicolectomy with anastomosis	20	4	79	4
Resection of transverse or left colon with anastomosis	24	6	142	12
Resection of transverse or left colon by Paul-Mikulicz method	33	6	62	11
Anterior resection of rectum with anastomosis	0	0	12	1
Abdomino-perineal excision of rectum	4	2	338	40
Perineal excision of rectum	46	4	5	0

Number of Patients Ultimately Cured by Radical Excision.—As nearly half the combined series of 1,644 cases surveyed in this paper were treated in the last five years, and as no reliable follow-up system was in operation during the earlier years, it is clearly impossible to provide any reliable information regarding the percentage of five-year survivors amongst the patients discharged after radical operation. However, Dukes (1944) has estimated that approximately 50% of the survivors from combined excision of the rectum are alive and well five years later, and Rankin and Graham (1950) claim that, of the survivors of radical operations for carcinoma of the colon, between 50 and 60%—depending on the precise site of the growth—live free of recurrence for at least five years. It would be tempting to suppose, therefore, that some 50% of the patients in this series who left hospital after a radical operation will survive for five years or more. It has to be remembered, however, that

included among these resection cases are a number of patients who underwent purely palliative resections in the presence of hepatic metastases or other evidences of irremovable growth. No question of cure arises in these cases, and their inclusion will obviously lower the five-year survivals. It would be too much to hope, therefore, that an overall cure rate of 50% will be achieved, but we reckon that the results should not fall far short of this figure.

Summary and Conclusions

The treatment and operative mortality of carcinoma of the large intestine are compared in two consecutive series of cases admitted to the General Infirmary at Leeds during 1938–43 and 1947–55 respectively.

In the former group of 485 cases the growth was found to be resectable in 26.2%, with an operative mortality of 18.8%. By comparison in the latter group of 1,159 cases resection was performed in 55%, with an operative mortality of 11.1%.

Approximately four-fifths of the growths in both series lay in the rectum or sigmoid, and the improvement in the resectability rate in the second series was due almost entirely to the more radical management of carcinomata in these situations during the latter period. The resectability of carcinoma of other parts of the large intestine remained much the same in the two periods under review.

The reduction in the immediate mortality following radical resection during the second period is attributed mainly to better control of fluid and electrolyte balance and to the use of antibiotics. The improvement in the results of emergency operations for the cases complicated by acute intestinal obstruction may have been due in large measure to these factors also, but was probably referable in part to changes in the choice of operation—namely, to the greater use of transverse colostomy instead of caecostomy for obstructed growths of the left colon. The high mortality of perforation of the colon with resulting peritonitis has remained virtually unchanged, making this still a most lethal complication of cancer of the large intestine.

We are indebted to our surgical colleagues at the Leeds General Infirmary for kind permission to include their patients in this survey, and to Professor E. Grebenik for much helpful criticism from the statistical point of view.

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