LYMPHOSARCOMA OF THE GASTRO-INTESTINAL TRACT

REPORT OF TWENTY CASES

BARTON MCSWAIN, M.D., AND JOHN M. BEAL, M.D.

NEW YORK, N. Y.

FROM THE DEPARTMENT OF SURGERY OF THE NEW YORK HOSPITAL AND CORNELL UNIVERSITY MEDICAL COLLEGE, NEW YORK, N. Y.

TWENTY CASES of lymphosarcoma of the gastro-intestinal tract have been treated in the New York Hospital during the past nine years. It is with the purpose of bringing out certain points in the treatment and presenting a follow-up study of these cases that this report is made.

No attempt at complete review of the literature will be made. For more extensive reviews, reference may be made to articles by Ullman and Abeshouse, Sugarbaker and Craven, Stout, and Madding and Walker. Stout collected 19 cases of lymphosarcoma of the gastro-intestinal tract encountered over a period of 21 years (1915–1935) at the Presbyterian Hospital in New York. He did not designate the site of occurrence of these tumors but stated that there were six five-year survivals. Madding and Walker reported 41 cases of lymphosarcoma of the stomach from the Mayo Clinic and concluded that the treatment should be surgical removal when possible, with roentgenotherapy administered as an adjunct. Abeshouse and Ullman, in 1932, compiled from the literature reports of 126 cases of lymphosarcoma of the intestines and stated that of 109 in which the site of the lesion was recorded, 77 were in the small intestine (36 in the ileum) and 32 in the large intestine. They found that lymphosarcoma was accompanied by metastases in practically every case. The average duration of life was 19 months for 85 cases upon whom operation was undertaken; ten cases were alive and well five or more years after operation with no sign of recurrence. McCann, in 1930, reported 32 cases of lymphosarcoma of the stomach.

Raiford (1932) reported 88 cases of tumors of the small intestine of which 21 were lymphoblastoma; one was from the duodenum, 18 the ileum and two from sites not determined. Warren and Lulenski (1942) reported 15 cases of lymphosarcoma, 13 of which were subjected to surgery with two apparent five-year cures. The average survival time was 2.5 years.

The relative frequency of lymphosarcoma in the esophagus, duodenum and appendix is attested by reviews such as those of Corner and Fairbanks, Friend, Crowthers, Goldstein, Libman and Eisenbrey. Corner and Fairbanks, in 1904, collected from the literature 14 sarcomas of the esophagus, one a lymphosarcoma which is not described other than by diagnosis. They also cite two instances of "sarcoma" of the appendix without further elucidation. Friend reported 20 collected cases of sarcoma of the appendix; four of these, including his own case, showed the microscopic findings characteristic of lymphosarcoma. Four apparently authentic cases of lymphosarcoma of the duodenum are cited by Crowther.

Incidence.—In 149,469 admissions to the New York Hospital between 1933 and 1942, 20 cases of lymphosarcoma of the gastro-intestinal tract were observed, the diagnosis in all of these being confirmed by microscopic examination. During the same nine-year period 68 carcinomas of the esophagus, 384 carcinomas of the stomach, 11 malignant lesions of the small intestine, and 568 carcinomas of the large intestine and rectum were encountered. By comparing these figures to those which appear in Table I, the relative frequency of lymphosarcoma in our series may be seen. It is an incidence of one case of lymphosarcoma to every 51 cases of carcinoma, or 1.9 per cent of all malignant lesions of the gastro-intestinal tract. This percentage is considerably higher than that of 0.9 per cent given by Warren and Lulenski, who included in this figure their cases of Hodgkin's disease.

TABLE I

LOCATION OF LYMPHOSARCOMA IN THE GASTRO-INTESTINAL TRACT

Location		No. of Cases
Esophagus		1
Stomach		7
Small intestine:		3
Jejunum	1	
Ileum	2	
Appendix		2
Large intestine:		7
Cecal region	2	
Transverse colon	1	
Sigmoid colon	1	
Rectum	3	
Total		20

In this series there were 13 males and 7 females. The ages ranged from 4.5 to 71 years, 12 of the cases being between the ages of 40 and 60 (Table II). The average age was 43.2 years.

TABLE II

AGE INCIDENCE OF LYMPHOSARCOMA

Age in Years	No. of Cases
0–10	2
10–20	1
20–30	1
30–40	4
40–50	3
50–60	5
60–70	3
70+	1
Total	20

CLINICAL MANIFESTATIONS AND PREOPERATIVE DIAGNOSIS

Esophagus.—The single case (Case 1) of lymphosarcoma of the esophagus occurred in a 62-year-old woman, who was admitted complaining of vomiting for five months, during which time she had noted epigastric pain and burning and the sensation that food stuck in her chest. She had lost 60 pounds in one

year, and had had one tarry stool. There were no significant physical findings except evidence of marked loss of weight. There was nothing in the clinical picture to distinguish this from any other malignant lesion of the lower end of the esophagus.

Laboratory data other than roentgenologic were unremarkable. Blood count and examinations of the stool for occult blood were negative.

Gastro-intestinal roentgenologic series (Fig. 1) showed a filling defect in the cardia of the stomach, with narrowing and irregularity of the lower end of the esophagus and a penetrating defect of the lower border of the tumor. *Roentgenologic Diagnosis:* Carcinoma of esophagus.

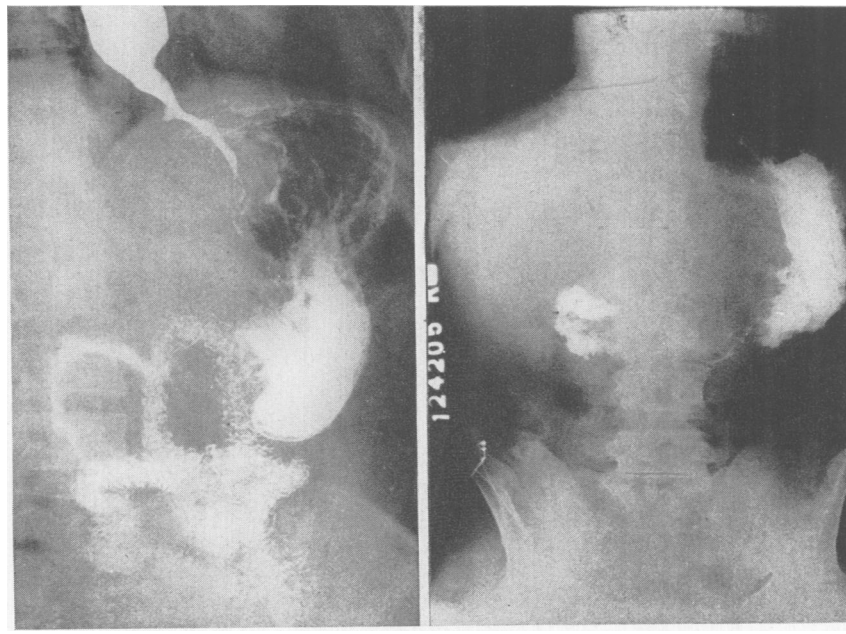

FIG. 1.—Case 1: Roentgenogram showing filling defect in the cardia of the stomach, with narrowing and irregularity of the lower end of the esophagus and a penetrating defect of the lower border of the tumor.

FIG. 2.—Case 8: Roentgenogram showing extensive involvement of the stomach by tumor and typical whorl-like formation along the lesser and greater curvatures in the region of the antrum.

Stomach.—In this group of seven cases there were four females and three males, their ages varying from 43 to 65. The chief complaints elicited were weakness, pallor, anorexia, abdominal pain, "indigestion," nausea and vomiting. The duration of the symptoms varied from 2.5 weeks to 7 months. Six of the seven patients had epigastric pain and five had had vomiting. Three patients had noted tarry stools. There was a history of loss of weight in five patients varying from 9 to 40 pounds. Other symptoms were dysphagia, mass in the upper abdomen, and mass in the right axilla.

Physical examination showed five patients to be afebrile while two had slight fever (38°–38.6° C.). The state of nutrition in four patients was good on admission but there was evidence of loss of weight in three. Only

two had palpable lymph nodes (right axillary in Case 8 and cervical in Case 6). Abdominal examination in four showed the presence of an epigastric mass; in three the mass was slightly tender. Rectal examination revealed an irregular, firm and nontender mass in the cul-de-sac of one patient.

Laboratory findings were of no value in arriving at an accurate diagnosis. Four patients had moderate secondary anemia, the hemoglobin values being 9 to 12 Gm., and the erythrocyte count 3.3 to 3.8 million. The total leukocyte count was normal in all but one, in which it was 13,000; the differential count was normal in all cases. No case of lymphocytosis was observed. The stools were guaiac-positive in five instances. Gastric analysis was performed in six cases; in four there was no fasting free acid, and Case 4 had no free acid after the injection of histamine; the remainder had from 12 to 80 units of free acid.

Two patients were subjected to gastroscopy. In Case 3 a granular area without ulceration was seen on the lesser curvature, and in Case 4 the gastric wall was stenosed and rimmed with tumor. The impression in both was gastric carcinoma.

All patients had gastro-intestinal roentgenograms; a preoperative diagnosis of lymphosarcoma was made in one (Fig. 2, Case 8) and gastric carcinoma in seven. The location of the tumors was as follows: Pylorus, 5 (Cases 3, 4, 5, 6 and 7). Entire stomach, 1 (Case 8). Greater curvature, 1 (Case 2).

In one of the cases in which the lesion was found in the pylorus (Case 3), it also extended up the lesser curvature, where a large crater was observed. In another patient with a pyloric tumor (Case 7), a defective duodenal cap was demonstrated; this patient had an ulcer history of one year's duration.

Small Intestine.—The small intestine was the site of lymphosarcoma in three patients, all of whom were males. In one the lesion was in the jejunum and in the other two in the ileum. All patients had a history of abdominal pain, nausea and vomiting. Two had manifestations of intestinal obstruction. One patient had gross blood in the stool and two had tarry stools. Only one patient had lost weight, in his case 30 pounds in three months.

Physical examination showed increased temperature (38°–39.6° C. in Case 9) before operation in one; the others were afebrile. All patients showed evidence of recent decrease in weight, although only one had given a history of loss of weight. Two had palpable nodes in the cervical, axillary and inguinal regions. Rectal examination was negative in all cases.

One patient had a marked secondary anemia (Case 10, hemoglobin 8 Gm.; erythrocyte count 3.1 million); the other two did not have anemia. The white cell and differential counts were normal in all three instances. The stools of two patients were positive by the benzidine test (Cases 9 and 10).

Roentgenologic studies were made in only two patients. One (Case 10) had a barium enema, which showed a normal colon. A diagnosis of lymphosarcoma was made in one patient (Case 9) by means of a gastro-intestinal series, which showed dilatation of the second portion of the duodenum and proximal portion of the jejunum.

Appendix.—There were two cases of lymphosarcoma involving the appendix; both were females, and their ages were 39 and 47 years.

Their symptoms and physical findings were as follows: One patient had had pain in the right lower quadrant of the abdomen for two days, with nausea and vomiting, and she gave a history of a similar episode six years previously. The physical findings were typical of appendicitis. Her temperature was 39.8° C; she had diffuse rigidity in both lower quadrants and marked tenderness over McBurney's point. No mass was palpated and no tenderness elicited on rectal examination.

The second patient had no symptoms referable to the gastro-intestinal tract. She was admitted to the hospital for bleeding from a fibromyoma of the uterus. A mass was palpable in the left adnexal region. There were no other physical signs of significance.

Neither patient had palpable lymph nodes. Neither roentgenologic studies nor stool examinations were made.

Large Intestine.—Lymphosarcoma of the large intestine occurred in seven patients, all of whom were males with ages ranging from 4.5 to 65 years. The sites were: Cecum (involving appendix and terminal ileum), 2. Transverse colon, 1. Sigmoid colon, 1. Rectum, 3.

The chief complaints were abdominal pain, pruritus ani, constipation, abdominal mass, and rectal bleeding. The duration of symptoms varied from four weeks to four years. Other symptoms were diarrhea, distention, and increased temperature. One patient had had a duodenal ulcer for three years. Abdominal pain was present in four cases, vomiting in only one, symptoms of intestinal obstruction in one, bloody stools in three, and loss of from 9 to 25 pounds in weight in four.

Physical examination revealed that all patients were afebrile on admission. Four showed evidences of loss of weight. In only three patients were there palpable nodes, all of these being in the inguinal region. Abdominal masses were palpable in three instances; epigastric in one, lower right quadrant in one, and lower left quadrant in the third. Abdominal tenderness was present in four patients. Rectal examination in five of the seven cases disclosed the presence of a mass; two of the lesions appearing clinically to be rectal polypi.

Laboratory data showed the presence of secondary anemia in two cases (Cases 13 and 17—hemoglobin 9.6 and 10.2 Gm., respectively). In one case (Case 17) there was a leukocytosis of 21,700, with 58 per cent lymphocytes; this was the patient with a large inoperable tumor of the sigmoid, who later developed metastases in distant nodes. In the other cases the total leukocyte and differential cell counts were within normal limits.

Proctoscopic examinations were made in five of the seven patients, and normal rectal mucosa was found in two. In one, examination showed an ulcerated, fungating lesion 7 cm. above the internal sphincter on the left rectal wall (Case 17), and in another, a reddened mass on the right wall 2 x 3 cm. in size, with a broad pedicle, and no ulceration (Case 20). Case 18

presented a 7-mm. polypus anteriorly about 5 cm. from the anus, and Case 19 had four rectal polypi.

Barium enemas were given in five instances, and showed normal colons in two cases with rectal lesions. In two cases there were filling defects in the cecum; one (Fig. 3) showing an intussusception of the terminal ileum into the ascending colon. In one, a filling defect was demonstrated in the distal transverse colon (Fig. 4) 10 cm. proximal to which a second constricting lesion was seen. The roentgenologic diagnosis was carcinoma in two, lymphosarcoma in one, and intussusception in one case.

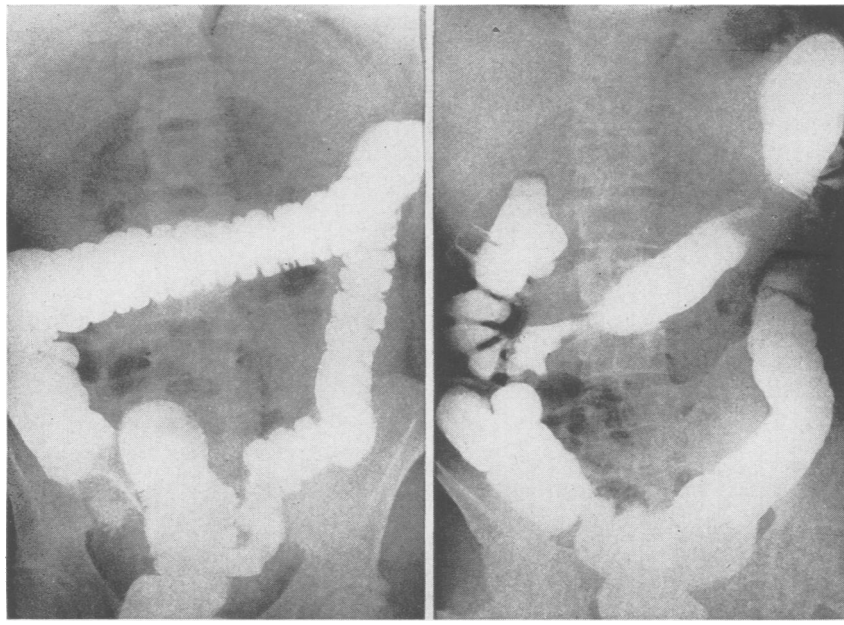

FIG. 3.—Case 12: Barium enema demonstrating intussusception of the terminal ileum into the ascending colon.
FIG. 4.—Case 16: Roentgenogram showing defect in the distal transverse colon and a second constricting lesion proximal to it.

OPERATIVE FINDINGS AND THERAPY

Seventeen operations were performed upon 16 patients, excluding exploratory celiotomies and biopsies. Abdominal explorations and biopsies were undertaken in four cases, excision of a lymph node for microscopic examination once, and proctoscopy and biopsy once (Table III).

Esophagus.—At operation this tumor was found to involve the distal 2.5 cm. of the esophagus, extending to the cardia of the stomach, without demonstrable metastases to the liver or regional lymph nodes.

In this single case (Case 1), exploratory celiotomy and ligation of the left gastric artery was done, followed five days later by resection of the lower esophagus and cardia of the stomach, with esophagogastrostomy by the thoracic approach.

Stomach.—The main regions of involvement by tumor at operation were the lesser curvature in two cases, the greater curvature in two cases, and

TABLE III

OPERATIVE PROCEDURES

Resections:		
Gastric resection:		
Wedge resection	1	
Subtotal resection	5	
Resection of jejunum		1
Appendicectomy		2
Exploration and ligation of left gastric artery		1
Resection lower esophagus, with esophagogastrostomy		1
Excision of rectal polypi		2
Palliative:		
Partial reduction of intussusception		1
Ileo-ileostomy		1
Ileocolostomy		1
Cecostomy		1
Diagnostic:		
Lymph node biopsy		1
Proctoscopy and biopsy		1
Exploratory celiotomy and biopsy		4
Total		23

the antrum and posterior wall in one. In one case two thirds of the stomach was involved, with extension into the abdominal wall. In the remaining case, which was not explored—the diagnosis being made by supraclavicular lymph node biopsy—gastro-intestinal series showed involvement of the entire stomach.

In all cases but one the tumor was large and resection of at least two-thirds of the stomach was necessary in four cases. In none was the diagnosis of lymphosarcoma made at operation. Involvement of the regional nodes was noted in four cases, absent in one, and not mentioned in one. Liver metastases were not present.

One patient was subjected to excision of a supraclavicular lymph node, one to a wedge resection of the stomach, and the other five to subtotal gastric resections.

Jejunum.—In this single case there were three separate lesions, 15 cm. apart, with partial obstruction causing dilatation of the duodenum and proximal jejunum. The operation performed was a resection of the proximal 40 cm. of jejunum, removal of mesenteric nodes, which contained metastases, and lateral anastomosis.

Ileum.—In one case there was a tumor, 45 cm. proximal to the ileocecal valve, obstructing the lumen and involving the mesenteric nodes. An entero-enterostomy and biopsy of lymph nodes was done.

In the second case the lesion lay in the terminal ileum, producing intestinal obstruction. A palliative ileocolostomy was performed.

Appendix.—In one case the appendix contained a wart-like swelling in its middle third; in the other no tumor was noted on gross inspection at operation. Appendicectomy alone was performed in both instances.

Large Intestine.—In one case the cecum, the appendix and the terminal ileum were involved in a hard, nodular mass causing intussusception of the terminal ileum extending as far as the descending colon. Partial reduction of the intussusception was carried out, followed in seven weeks by an exploratory celiotomy which revealed that the lesion was inoperable and biopsy alone was performed. Large retroperitoneal masses were found. A second case, with involvement of the cecum, the appendix and the terminal ileum, had an appendicectomy and biopsy of lymph nodes.

TABLE IV

SUMMARY OF RESULTS OPERATIVE AND ROENTGENOTHERAPY

	No. of Cases		Follow-up Years	Months
Operative and Roentgenotherapy:				
Living without recurrence	2			
Case 5			1	
Case 9			9	5
Living with recurrence	1			
Case 3			3	5
Dead	3			
Case 4			1	10
Case 6				10
Case 7				1
Roentgenotherapy alone:				
Living without recurrence	2			
Case 10			9	6
Case 20			1	8
Living with recurrence	1			
Case 17			4	2
Dead	3			
Case 11			6	
Case 12				4
Case 16				2
Not followed	1			
Case 13				
Operation only:				
Living without recurrence	5			
Case 1			2	4
Case 14			4	3
Case 15			2	2
Case 18			2	4
Case 19			2	2
Living with recurrence	0			
Dead without recurrence	1			
Case 2			7	2
No treatment	1			
Dead				
Case 8				½
Total	20			

The transverse colon was the site of involvement in one case. In the midportion there was an annular, freely movable tumor, 6 cm. in length, with a second similar lesion 15 cm. distal to the first, with infiltration of the gastrocolic ligament and metastases in the liver. Biopsy only was feasible.

In the isolated instance in which the sigmoid was the site of lymphosarcoma, exploratory celiotomy revealed 12 cm. of the sigmoid colon to be shrunken, indurated, and to contain palpable nodules, which were biopsied.

Rectum.—One case had four polypi 7 cm. from the mucocutaneous junction; another had a polypus about 2 cm. above the internal sphincter, and the

third presented a 2 x 3 cm. mass just above the internal sphincter. In the first two patients excision of the rectal polypi was performed and a biopsy taken in the third.

ROENTGENOTHERAPY

Thirteen of the 20 patients were given roentgenotherapy. Two of these (Cases 12 and 16) tolerated radiation so poorly that it was discontinued before the outlined dosage could be given; both of these patients died of fulminating lymphosarcoma. (Table IV)

TABLE V

MICROSCOPIC PATHOLOGY

Microscopic Pathology	No. of Cases	Dead	Alive with Recurrence	Alive without Recurrence
Reticulum cell sarcoma	1	0	1	0
Large cell lymphosarcoma	4	3 (or 4*)	?*	
Small cell lymphosarcoma	12	4	0	8
Giant follicle sarcoma	3	1	1	1

*Case 13 not followed.

Six of the patients were subjected to resection of the tumor followed by prophylactic roentgenotherapy. Case 7 died of postoperative hemorrhage 33 days following gastric resection, after having received 330 r. through three upper abdominal portals. Three patients received roentgenotherapy in addition to palliative procedures, four received roentgenotherapy alone and in six resection only was performed.

In all instances that tolerated the therapy the response to the roentgen-ray was good as far as the local lesion was concerned. Palpable masses often melted away dramatically following irradiation. One patient with involvement of the cecum received 700 r. through four portals to the right abdominal mass, which diminished in size but rapidly became larger when the therapy had to be discontinued because the patient developed marked anemia and leukopenia.

In this small series of cases the prognosis was better in the small cell lymphosarcoma than in the other types of tumor (Table V). The roentgen-ray dosage varied considerably over the period of nine years but, in general, amounted to from 1400 to 2000 r. directed at the region involved through two to four portals.

PATHOLOGY

Gross Pathology.—In general, lymphosarcoma arises in the submucous layers of the intestinal tract and infiltrates the surrounding tissues. Usually all of the layers of the intestinal tract except the serosa are invaded but in two cases there was extension through the serosal surface of the stomach and invasion of the anterior abdominal wall. Involvement of regional nodes occurs frequently and was present in 12 cases in this series.

At operation, the gross appearance of lymphosarcoma differs sufficiently

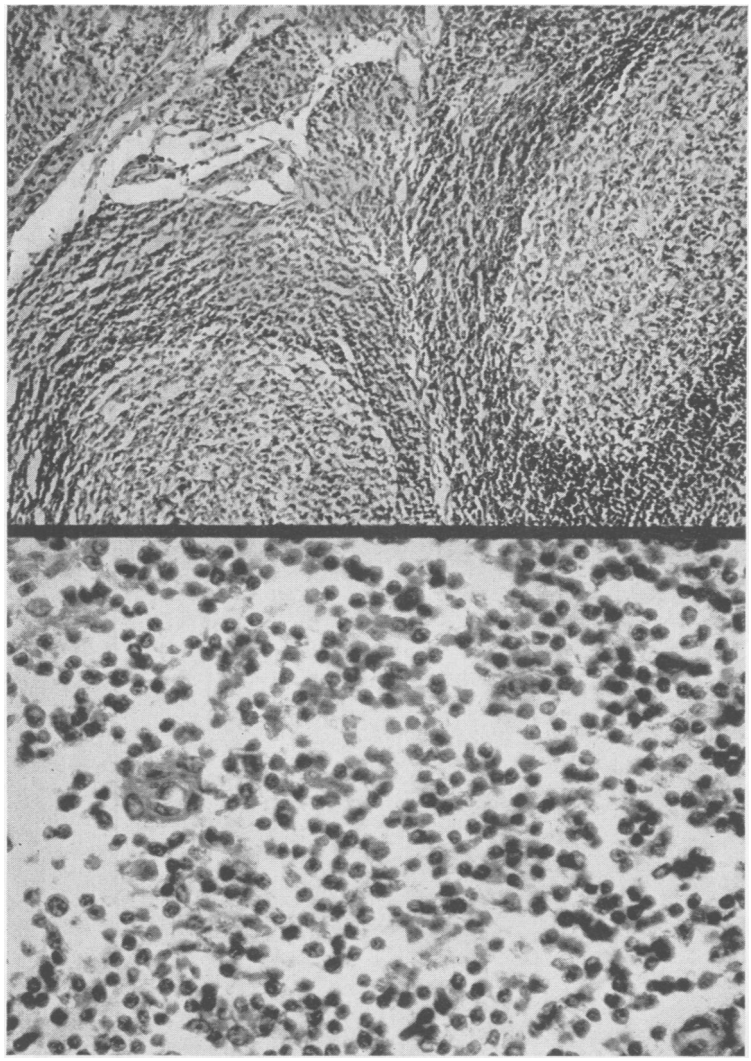

FIG. 5.—Case 17: (Sigmoid) Photomicrograph showing enlarged lymph follicles characteristic of giant follicle lymphosarcoma. (× 150)
FIG. 6:—Case 1: (Esophagus) Photomicrograph showing uniform small lymphocytes and scant stroma in a small cell lymphosarcoma. (× 600)

from that of carcinoma to be identified or suspected at operation. The lymphosarcomatous mass usually is firm but softer than the hard consistency of carcinoma; it is friable, often rubbery and nodular, and the cut-surface resembles the whitish-grey homogenous appearance of lymphoid tissue. Ulceration is frequent and occurred in at least five of the cases reported.

Microscopic Pathology.—The tumors in this series were classified as (1) nodular lymphosarcoma; (2) small round cell lymphosarcoma; (3) large round cell lymphosarcoma; and (4) reticulum cell lymphosarcoma. Nodular lymphosarcoma (giant folliculoma or Brill-Symmer's disease, Fig. 5) is characterized by enlargement of the lymph follicles, composed of cells with

large vesicular nuclei and showing numerous mitoses; they should not show phagocytosis. The large and small cell lymphosarcomas (Figs. 6, 7 and 8) both show disruption of the normal lymph node architecture, invasion of the capsule, numerous mitoses, with predominance, on the one hand, of the

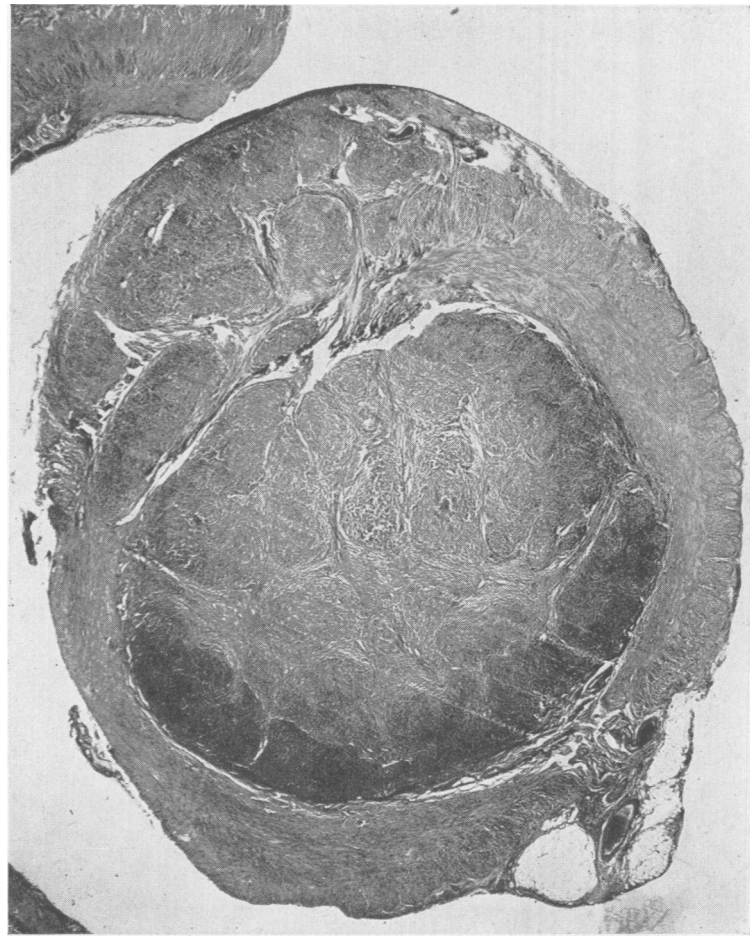

FIG. 7.—Case 15: (Appendix) Cross-section of lumen filled with large lymphoid follicles which replace the mucosa and submucosa of the appendix. (× 10)

large lymphoblast and, on the other, of the small lymphocyte. Usually the struma is scanty. Reticulum cell sarcoma (Fig. 9) is recognized by the sheets of cells, often crescentic, tailed or polyhedral in shape, with large clear nuclei; by the loss of the normal lymph node architecture and the demonstration of the characteristic reticulum fibers by special stains (notably the method of silver impregnation of Foot and Foot).

The relation of histologic pattern to survival time is illustrated in Tables V and VI.

All cases were reviewed by Dr. N. C. Foot, with the authors, and were verified by him as being lymphosarcoma of the groups as classified above.

TABLE VI

Case No.	Sex	Age	Site	History	Duration	Physical Findings	Laboratory Findings: Blood	Laboratory Findings: Gastric	Laboratory Findings: Stool	Preoperative Diagnosis	Treatment: Operation	Treatment: X-Ray	Pathologic Diagnosis	Follow-up	
1	F	62	Esophagus	Vomiting; epigastric pain; 60 lb. wt. loss	5 mos.	Emaciation				Carcinoma	Resection lower esophagus	No	Small cell lymphosarcoma	Alive and well 2 yrs., 4 mos.**	0
2	F	54	Stomach	Weakness; pallor; tarry stools; vomiting	2 wks.		Hb. 11 Gm. R.B.C. 3.5	Low acid		Carcinoma	Wedge resection stomach	No	Small cell lymphosarcoma	Died.* 7 yrs., 2 mos.	0
3	F	51	Stomach	"Indigestion"	3 mos.	Epigastric tenderness		Normal	Guaiac-positive	Carcinoma	Gastric resection	Yes	Reticulum cell sarcoma	Alive 3 yrs., 5 mos.	x
4	F	43	Stomach	Epigastric pain; nausea, vomiting; 40 lbs. wt. loss	9 mos.	Nontender epigastric mass	Hb. 9.5 Gm. R.B.C. 3.8	Anacidity		Carcinoma	Gastric resection	Yes	Large cell lymphosarcoma	Died. 1 yr., 10 mos.	xx
5	M	58	Stomach	Epigastric pain; 10 lb. wt. loss	3 mos.	Tender epigastric mass		Low acid	Guaiac-positive	Carcinoma	Gastric resection	Yes	Small cell lymphosarcoma	Alive and well 1 yr.	x
6	F	65	Stomach	Epigastric pain; mass; nausea; tarry stool; 9 lb. wt. loss	4 mos.	Cervical node. Tender epigastric mass; mass in cul-de-sac T. 38.6° C.	Hb. 9.5 Gm. R.B.C. 3.3	Low acid	Guaiac-positive	Carcinoma	Gastric resection	Yes	Small cell lymphosarcoma	Died. 10 mos.	xx
7	M	52	Stomach	Nausea, vomiting; epigastric pain; tarry stools	2 wks.	Negative	W.B.C. 13,600	Normal	Guaiac-positive	Carcinoma	Gastric resection	Yes	Large cell lymphosarcoma	Died. 1 mo.	xx
8	M	58	Stomach	Anorexia; upper abd. pain; 20 lb. wt. loss	3 mos.	T. 38.° C.; axillary mass; tender epigastric mass	Hb. 12 Gm. R.B.C. 3.8		Guaiac-positive	Lymphosarcoma	Biopsy lymph node	No	Large cell lymphosarcoma	Died. 2 wks.	xx
9	M	33	Jejunum	Epigastric pain, vomiting, tarry stools, 30 lb. wt. loss	3 mos.	General lymphadenopathy. T. 39.° C.		Normal	Benzidine-positive	Lymphosarcoma	Resection of jejunum	Yes	Large cell lymphosarcoma	Alive and well 9 yrs., 6 mos.	x
10	M	5	Ileum	Lower abd. pain; vomiting, bloody stools	1 mo.	General lymphadenopathy	Hb. 8 Gm. R.B.C. 3.1		Benzidine-positive	Intussusception	Ileo-ileostomy	Yes	Small cell lymphosarcoma	Alive and well. 9 yrs., 5 mos.	x
11	M	71	Ileum	Intestinal obstruction						Carcinoma	Ileocolostomy	Yes	Small cell lymphosarcoma	Died. 6 yrs.	x
12	M	4½	Cecal region	Abd. pain; vomiting; 9 lb. wt. loss	1 mo.	Mass in L.L.Q.			Guaiac-positive	Intussusception	Reduction of intussusception	Yes	Small cell lymphosarcoma	Died. 4 mos.	xx
13	M	31	Cecal region	Abd. mass; bloody stools; marked wt. loss	1 mo.	Tender R.L.Q. mass; inguinal nodes; emaciation	Hb. 9.6 Gm. R.B.C. 3.4		Guaiac-positive	Lymphosarcoma	Appendicectomy and biopsy	Yes	Large cell lymphosarcoma	Not followed.	xx
14	F	47	Appendix	R.L.Q. pain; nausea and vomiting	2 days	T. 39.8° C.; R.L.Q. tenderness				Appendicitis	Appendicectomy	No	Small cell lymphosarcoma	4 yrs., 3 mos. Alive and well.	0
15	F	39	Appendix	No. G. I. symptoms						Lt. ovarian tumor	Appendicectomy	No	Giant follicle	Alive and well. 2 yrs., 2 mos.	0
16	M	37	Transverse colon	L.U.Q. pain; partial obstruction; 18 lb. wt. loss	7 mos.	Inguinal nodes; epigastric mass; L.U.Q. tenderness			Benzidine-positive	Carcinoma	Cecostomy exp. celiotomy	Yes	Giant follicle	Died. 2 mos., 2 wks.	xx
17	M	65	Sigmoid	Abd. pain; bloody stools; 25 lb. wt. loss	1 yr.	Rectal mass; L.U.Q. tenderness; distention	W.B.C. 21,700 Lymphocyt. 58%; Hb. 10.2 Gm.			Carcinoma	Exploratory celiotomy	Yes	Giant follicle	Alive. 4 yrs., 3 mos.	xx
18	M	24	Rectum	Rectal bleeding	4 yrs.	Rectal polypus				Rectal polypus	Excision of polypus	No	Small cell lymphosarcoma	Alive and well. 2 yrs., 4 mos.	0
19	M	20	Rectum	Pruritus ani	1 yr.	4 rectal polypi; inguinal nodes				Fissure in ano	Excision of polypi	No	Small cell lymphosarcoma	Alive and well. 2 yrs., 2 mos.	0
20	M	45	Rectum	"Constipation"	1 yr.	Rectal mass				Rectal polypus	Proctoscopy and biopsy	Yes	Small cell lymphosarcoma	Alive and well. 1 yr., 8 mos.	0

*Died of hypertensive cardiovascular disease with no evidence of recurrence.
**Had left radical mastectomy for adenocarcinoma of breast with axillary metastases 2 yrs. after resection of esophagus; discharged well.
0 at end of column denotes solitary tumors.
x at end of column denotes regional node involvement without widespread metastases.
xx at end of column denotes metastases upon first examination, some with regional nodes, some without verified regional node involvement.

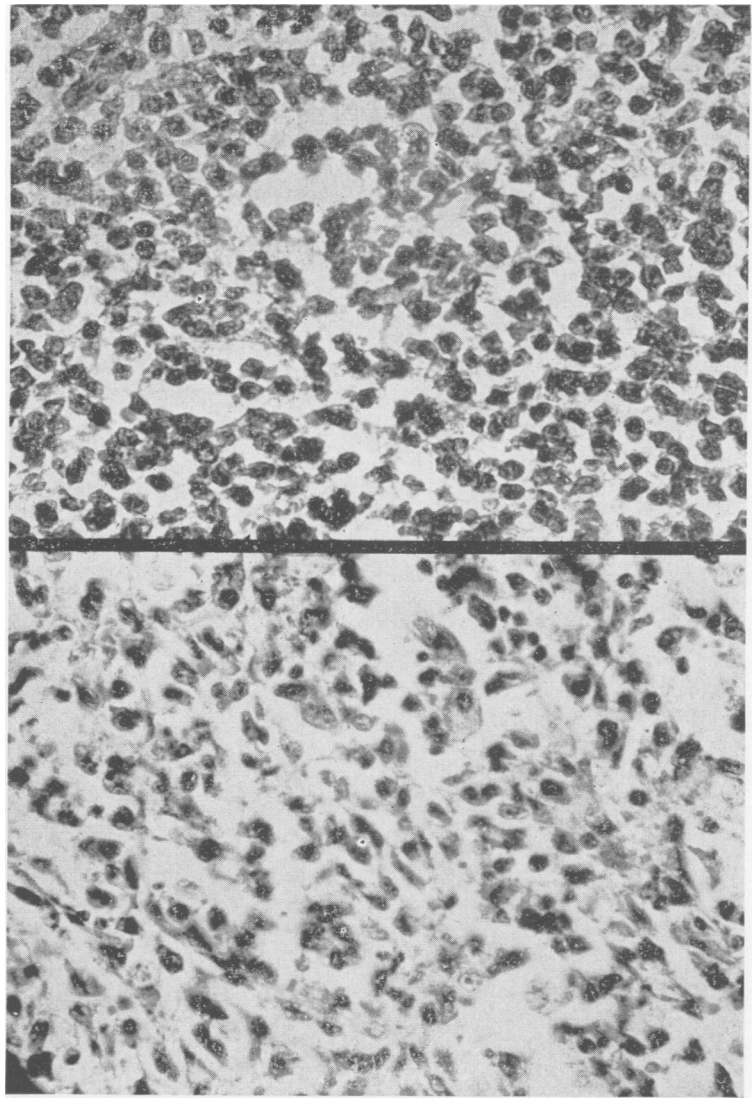

FIG. 8.—Case 9: (Jejunum) Photomicrograph showing uniform large lymphoblasts with numerous mitoses and scant stroma. (× 600)
FIG. 9.—Case 3: (Stomach) Photomicrograph of reticulum cell sarcoma demonstrating large reticulum cells with tailed and polyhedral cells. (× 600)

DISCUSSION.—*Diagnosis:* A diagnosis of lymphosarcoma of the gastro-intestinal tract seldom is made before histologic examination, due to the fact that the signs and symptoms produced by this type of malignant growth are little different from those caused by other gastro-intestinal neoplasms.

Although there is nothing specific in the clinical manifestations of these patients which might lead to a diagnosis of lymphosarcoma, the appearance of the mass soon after the onset of symptoms is suggestive of this type of tumor, as is a large mass in a patient in good general condition.[14]

A roentgenologic diagnosis of lymphosarcoma was made in only three cases in this series. It is difficult to differentiate lymphosarcoma by roentgenologic examination because the picture so closely resembles that of carcinoma; however, there are diagnostic points which suggest lymphosarcoma; *i.e.*, (1) the large size of the lesion in relation to the short duration of symptoms;[14] and (2) the presence of whorl-like defects in the barium outline (Figs. 2 and 10). In the diagnosis of neoplasms of the colon, a double or

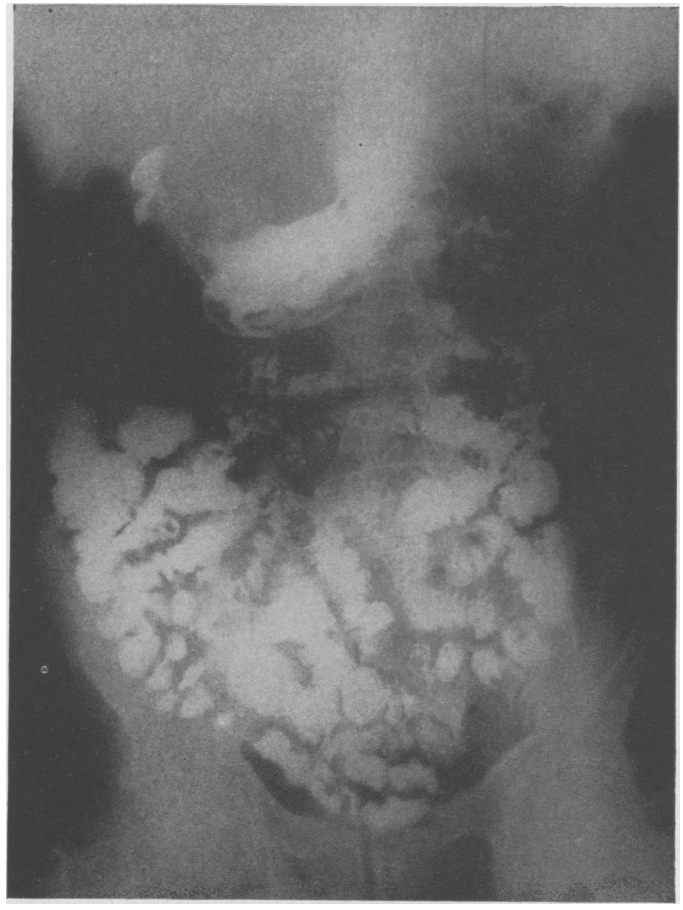

FIG. 10.—Case 5: Roentgenogram of stomach showing whorl-like defects along the greater curvature.

an usually long mass is suggestive of lymphosarcoma. Tuberculous colitis and regional colitis must be ruled out before this diagnosis is made. When the above characteristics are present, the diagnosis of lymphosarcoma should be made; unfortunately, however, these roentgenologic findings often are absent and consequently the preoperative diagnosis usually is carcinoma.

Blood counts were throughout of no aid in diagnosis, the count having been unusual in only one case.

RESULTS OF TREATMENT

The survival of the patient is influenced more by the site and extent of the growth than by the histologic type of neoplasm or the age of the patient. The prognosis largely depends upon whether the lymphosarcoma is localized and can be treated as an isolated lesion, or whether a general spread has occurred.

The six patients in whom the lesion was sufficiently localized to allow extirpation, have survived from two to seven years without receiving roentgenotherapy. The location of these tumors was strikingly varied, involving as they did the esophagus, stomach, appendix and rectum. However, in all six cases the tumor was well-localized and without apparent lymph node involvement. One of these patients died later of an unrelated condition, without evidence of recurrence.

Of the six patients treated with roentgenotherapy alone, only two (Cases 10 and 20) are without evidence of recurrence. In two cases (Cases 5 and 9) resection of the lesion was followed by irradiation without evidence of a return of tumor. In four, resection followed by irradiation gave poor results. In one case (Case 6) irradiation was started five months after operation, obviously too late for maximum prophylactic value; Case 16 tolerated the therapy so poorly that it was discontinued. Case 4 had a large lesion originally and had recurrences involving the left inguinal and iliac chains of nodes. Still later she developed a large cutaneous mass in the left posterior thoracic region and shortly thereafter she expired. In general, the appearance of subcutaneous masses or nodules in lymphosarcoma is of grave prognostic significance. In contradiction to reports by some observers[15, 16] the reticulum cell sarcoma in this series was quite radiosensitive. The patient who had this type of tumor had had several recurrences over a period of three years; each time the tumor melted away rapidly after roentgenotherapy.

Nine patients are alive and without recurrence at present; their original tumors were located in the esophagus, stomach, jejunum, ileum, appendix (two) and rectum (three). One case of lymphosarcoma of the stomach died seven years and two months after operation from hypertensive cardiovascular disease, without evidence of recurrence.

SUMMARY

A series of 20 cases of microscopically proven lymphosarcoma of the gastro-intestinal tract is presented—the lesion having arisen in all areas of the gastro-intestinal tract except the duodenum.

The clinical manifestations, laboratory, roentgenologic and operative findings are reviewed and the treatment by operation and irradiation described.

Cures of five or more years were obtained after roentgenotherapy alone in one case (Case 10), after surgical extirpation in one (Case 2), and after a combination of the two in one (Case 9). Nine cases (47 per cent of cases followed) are alive and well at present, without evidence of recurrence from one year to nine years and five months since the diagnosis was established.

The mortality at the present state of follow-up is 42 per cent (8 of the 19 cases followed). From the time of establishment of the diagnosis in eight patients who died, the average duration of life was 24 months. The average for the entire series (including those now alive) was 37 months. The latter figure is of little importance because of the short period of time which has elapsed in six patients since the establishment of the diagnosis.

CONCLUSIONS

Lymphosarcoma may be found at any point in the gastro-intestinal tract, including the appendix.

The preoperative diagnosis of lymphosarcoma of the gastro-intestinal tract is rarely made.

The prognosis is most favorable in instances suitable for complete extirpation, and we think that resection should be undertaken, if technically possible, although in this small series of cases the duration of life was apparently shorter following a combination of resection and roentgenotherapy (11 months for three patients who died, 33 months for six patients, including three still living) than after roentgenotherapy alone (26 months for three patients who died, 44 months for six patients, including three living). Roentgenotherapy alone occasionally results in apparent cure.

Roentgenotherapy should be given in every case of lymphosarcoma of the gastro-intestinal tract unless the operator and surgical pathologist are certain that the lesion has been completely eradicated. Irradiation should be started as soon as the wound is healed and the patient is ambulatory.

We are indebted to Dr. John L. Sullivan and Dr. Harold Temple of the Roentgenologic Department of the New York Hospital, and to Dr. N. C. Foot of the Department of Surgical Pathology for their valuable suggestions and advice.

REFERENCES

1 Balfour, D. C., and McCann, J. C.: Sarcoma of Stomach. Surg., Gynec. & Obst., 50, 948–953, 1930.

2 Corner, E. M., and Fairbanks, H. A.: Sarcomata of the Alimentary Canal. Practitioner, 72, 810, 1904.

3 Crowther, C. (quoted by Ullman and Abeshouse[15]) : Studio dei sarcoma primitive dell intestine tenne. Clin. chir. Milano, 21, 2107, 1913.

4 Eisenbrey, A. B.: Sarcoma of Intestine. Proc. N. Y. Path. Soc., 13, 116, 1913.

5 Foot, N. C., and Foot, E. B.: Technique of Silver Impregnation. Am. J. Path., 8, 245–254, 1932.

6 Friend, E.: Lymphosarcoma of Appendix with nonrotated Cecum: Review of Literature. Ill. Med. J., 1, 55, 1926.

7 Goldstein, H. I.: Primary Sarcoma of Intestine. Am. J. Surg., 35, 240, 1921.

8 Krumbhaar, E. B.: The Lymphomatoid Diseases. J. A. M. A., 106, 286–291, 1936.

9 Lalung-Bonnaire, Bablot, and Pham, van Lu. (quoted by Warren and Lulenski[16]) : Contribution a l'etude clinique et histologique des Tumeurs cervicales malignes et des tumeurs paradentaires chez les Annamites en Cochinchine. Bull. Asso. franc. p. l'étude du cancer, 15, 438, 1926.

[10] Libman, E.: Sarcoma of Small Intestine. Am. J. Med. Sci., **120,** 309, 1900.
[11] Madding, G. F., and Walters, W.: Lymphosarcoma of the Stomach. Arch. of Surg., **40,** 120–134, 1940.
[12] Raiford, T. S.: Tumors of the Small Intestine. Arch. of Surg., **25,** 122–177, 1932; *ibid:* **25,** 321–355, 1932.
[13] Stout, A. P.: Is Lymphosarcoma Curable? J. A. M. A., **118,** 968, 1942.
[14] Sugarbaker, E. D., and Craver, L. F.: Lymphosarcoma: Study of 196 Cases with Biopsy. J. A. M. A., **115,** 17, 1940; *ibid:* **115,** 112, 1940.
[15] Ullman, A., and Abeshouse, B. S.: Lymphosarcoma of Small and Large Intestine. ANNALS OF SURGERY, **95,** 878–915, 1932.
[16] Warren, S., and Lulenski, C. R.: Primary Solitary Lymphoid Tumors of the Gastrointestinal Tract. ANNALS OF SURGERY, **115,** 1–12, 1942.