

# SARCOMA OF THE STOMACH

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Between January, 1921, and January, 1945, 19 proved cases of gastric sarcoma were seen at Cleveland Clinic. Three have been described in previous publications.<sup>1,2</sup> Diagnoses have been confirmed by a recent review of microscopic sections in each case. The purpose of this report is to evaluate clinical features and diagnostic procedures, particularly roentgen and endoscopic examinations.

During the period covered by this study 1220 cases of malignant neoplasm of the stomach were seen at the Clinic, and 1.5 per cent were diagnosed as gastric sarcoma. Although this diagnosis is rare, when a biopsy reveals the presence of gastric sarcoma therapy may be more effective than in the case of carcinoma. An extensive review of the literature at the present time discloses the fact that from the standpoints of operability and curability sarcoma of the stomach is more amenable to surgical and roentgen therapy than carcinoma. However, an early diagnosis of sarcoma of the stomach may be more difficult than a diagnosis of carcinoma because, in contrast to the latter, involvement of the gastric mucosa may be a late development.

## Pathology

Ewing<sup>3</sup> defines sarcoma as a malignant tumor composed of cells of the connective tissue type, classifying them according to histogenesis as lymphosarcoma, fibrosarcoma, and neurosarcoma. A majority of these tumors are characterized grossly by a fungating, soft, or fleshy structure.

We have chosen to use the following modification of Ewing's classification, suggested by Goldblatt:<sup>4</sup>

1. Spindle cell myosarcoma
  - a. Leiomyosarcoma
  - b. Fibrosarcoma
  - c. Neurofibrosarcoma (neurogenic sarcoma)
2. Lymphosarcoma
  - a. Reticulum cell sarcoma
  - b. Malignant lymphocytoma (small round cell sarcoma, lymphocytic type lymphosarcoma)

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Using this classification the present series of 19 cases included:

**Lymphosarcoma:**

Malignant lymphocytoma	9 cases
Reticulum cell sarcoma	4 cases
Type undetermined (available material inadequate)	3 cases
Total	16 cases

**Spindle cell myosarcoma:**

Fibrosarcoma	2 cases
Leiomyosarcoma	1 case
Total	3 cases

These figures indicate a relatively high proportion of malignant lymphocytomas. Pack and McNeer<sup>5</sup> believed that most of the so-called primary lymphosarcomas are of the reticulum cell type and that relatively few are of the malignant lymphocytoma variety. On the other hand, Madding and Walters<sup>6</sup> reported the two types in about equal proportion.

The microscopic characteristics of the four types of gastric sarcoma included in this series are depicted and briefly described in fig. 1.

The location of the lesion varied considerably. Any portion of the stomach may be involved, but a majority of the lesions were situated on the lesser curvature and posterior wall.

Sarcomas are generally believed to metastasize by way of the blood stream, and as Ewing points out, lymphosarcoma is the single exception to this rule. The demonstration of metastatic lesions in lymph nodes strongly suggests either that the lesion is a lymphosarcoma or that it is not a sarcoma at all. Ewing remarks that while in the earlier stages of the disease lymphosarcoma appears to metastasize exclusively by way of the lymphatics, in many advanced cases true metastatic growths form in the lungs, brain, kidneys, skin, and other organs and are satisfactorily explained only by invasion of the blood vessels. Pack and McNeer state that the perigastric lymph nodes and the liver are usually the first sites of metastasis in lymphosarcoma. Bockus<sup>7</sup> believes that a nodule may be found in the skin more often in conjunction with sarcoma than with gastric carcinoma. Fenwick<sup>8</sup> found skin metastasis in 12 per cent of his collected cases of "round cell sarcomas" of the stomach. In our case 19 a large solitary metastatic nodule in the scalp was proved by biopsy to be fibrosarcoma. Biopsy later obtained from the gastric neoplasm verified the diagnosis.

### Clinical Features

**Age.** The average age of the 19 patients in this series was 54.2 years, the ages ranging from 27 to 68 years. The average age reported by

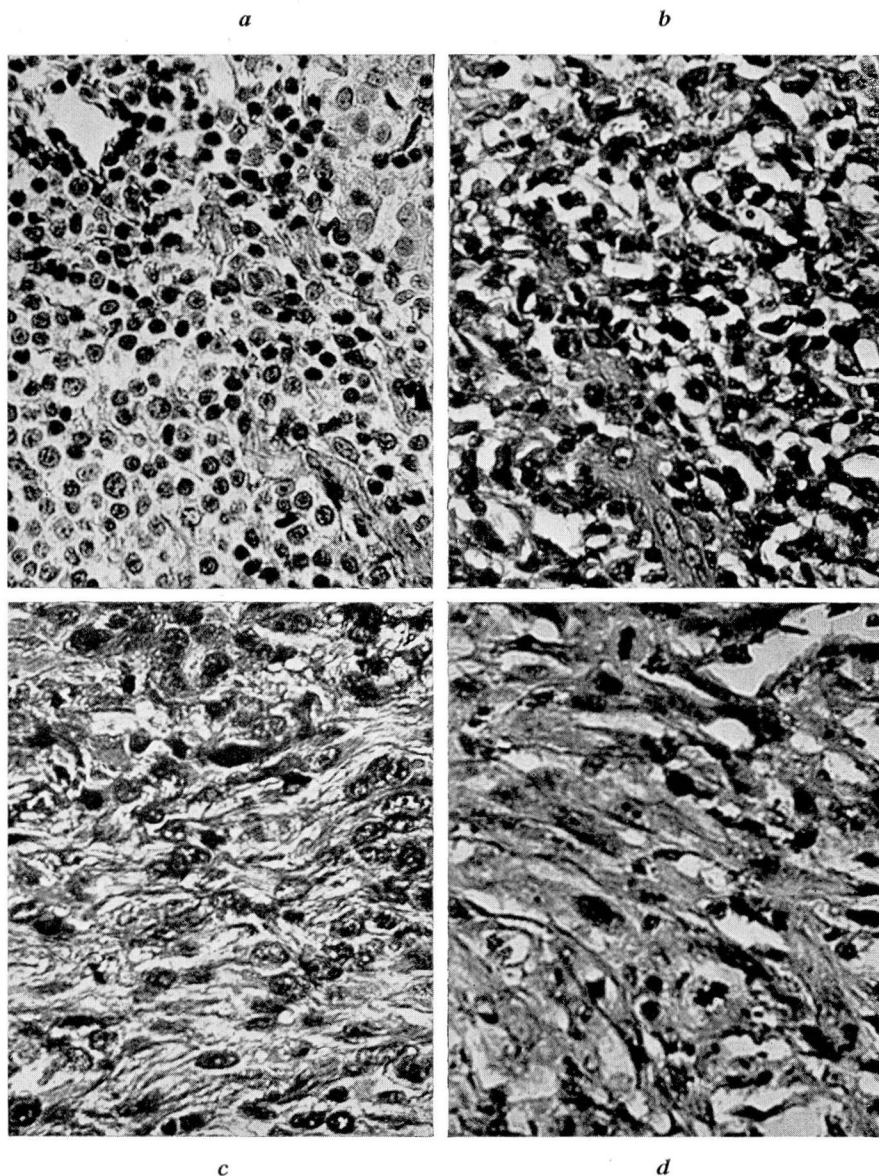


FIG. 1. (a) Case 4. Lymphosarcoma, lymphocytic type. Note richly cellular, closely packed tissue resembling normal lymphoid tissue; slight pleomorphism, infrequent mitotic figures (x500). (b) Case 5. Lymphosarcoma, reticulum cell type. Note larger, more angular cells with intimately connected reticulum fibrils. Mitotic figures frequent; marked pleomorphism; some multinucleated cells (x500). (c) Case 18. Fibrosarcoma. Note closely agglomerated, markedly pleomorphic cells with relatively abundant stroma of coarse collagen fibers. Nuclei vary greatly in size, shape, and staining reaction. Mitotic figures are abundant and frequently bizarre (x500). (d) Case 16. Leiomyosarcoma. Note dense masses and whorls of closely packed spindle shaped cells with scanty stroma. Marked variation in size, shape, and staining reaction of nuclei. Mitotic figures frequent and often atypical. Occasional giant cells (x500).

various other authors was: Pack and McNeer 46 years, Madding and Walters 46.7 years, Balfour and McCann<sup>9</sup> 43 years, and O'Donoghue and Jacobs<sup>10</sup> 41 years. Finlayson<sup>11</sup> reported the youngest patient as 3½ years of age, and Hunt<sup>12</sup> quotes DiGiaconna as having observed a sarcoma of the stomach in a patient of 91 years.

**Sex.** Fifteen patients were male and 4 were female. Reports in the literature<sup>5,9,13,14</sup> show a variation from equal distribution between the sexes to marked predominance of males over females.

**Symptoms.** The most common presenting complaint was upper abdominal pain, and the average duration of symptoms was 10.3 months.

In 12 patients the clinical picture resembled peptic ulcer, with characteristic pain-food-ease cycle. In 10 of these the clinical impression by the original examiner was peptic ulcer or peptic ulcer with possible malignant change. In every case having ulcer-like symptoms actual ulceration of the gastric mucosa was demonstrated by roentgenologic or gastroscopic examination or on examination of the surgical or necropsy specimen. Ulceration was present in 2 additional patients who did not have ulcer-like symptoms. None of the patients having nonulcerated lesions exhibited the ulcer-like syndrome. There were 5 nonulcerated lesions (2 lymphosarcomas, 2 fibrosarcomas, and 1 leiomyosarcoma). In a number of the cases of lymphosarcoma with ulcer-like symptoms there was a history of recent change in the symptoms, such as progressively increasing pain without even brief remissions or failure of the pain to be relieved by food or alkalis. In some instances additional evidence, such as a palpable mass in the abdomen or bleeding from the gastrointestinal tract, weight loss, or evidence of metastases, suggested that the lesion was malignant. Balfour and McCann found a history suggestive of peptic ulcer in 15 of their 54 cases. Pack and McNeer noted that abdominal pain occurred only in the presence of ulceration of the mucosa. Madding and Walters found that pain was a feature in all of their 67 cases and that it did not seem to depend entirely upon ulceration of the mucosa. They believed that it was due in part to the proximity of the submucous plexus of nerves and peritoneum as well as to early infiltration of the muscular layers of the stomach. They further remarked that the patient frequently gave a history simulating peptic ulcer. Rafsky, Katz, and Krieger<sup>13</sup> reported that 6 of their 12 patients gave a history simulating peptic ulcer.

**Weight loss** was a significant symptom in all but 2 of the 19 patients. The greatest weight loss was 59 pounds, the average being 21.9 pounds.

Nausea and vomiting, weakness, anorexia, and sour eructations were occasionally noted. Hematemesis and melena were present in patients

1 and 8; melena alone occurred in patient 17. Patients 3 and 7 had acute, massive gastrointestinal hemorrhages with subsequent development of symptoms of shock. Archer and Cooper<sup>15</sup> reported that hematemesis is relatively rare but that melena is not infrequent in gastric sarcomas, as did Taylor<sup>16</sup> and Yarnis and Colp.<sup>17</sup> Madding and Walters stated that in sarcoma blood does not appear in the gastric contents of the stools as frequently as in carcinoma.

Perforation is a rare complication of sarcoma of the stomach. In the present series patient 7 suffered an acute perforation from a reticulum cell sarcoma located on the anterior wall of the pars media on the lesser curvature. As described by Koucky *et al.*,<sup>18</sup> perforation may be (1) free with generalized peritonitis, (2) sealed with localized peritonitis or abscess, or (3) extended into the surrounding structures with or without sarcoma of the peritoneum.

**Physical examination.** A palpable mass in the abdomen was found in 4 of 16 cases of lymphosarcoma but was present in each of the 3 cases of spindle cell myosarcoma. Emaciation or poor nutrition was usually noted, and in a few cases pallor of the skin and mucous membranes was observed. In nearly all cases abdominal tenderness was present.

**Laboratory data.** Less than half of the patients had hypochromic anemia. Three patients with marked anemia had lost a considerable amount of blood from the gastrointestinal tract.

Only 5 of the 19 patients had stool examinations, and no conclusions were warranted. One test was negative, all the rest positive for occult blood.

Eleven patients had a gastric analysis using the Ewald test meal and a single forty-five-minute extraction. Nine of the samples were positive for occult blood. In 4 cases there was no free hydrochloric acid in the gastric contents, in 4 the values were between 40 and 60 units, and in 3 the values were above 70 clinical units. Results of a questionnaire by Archer and Cooper showed normal or increased values for gastric acidity in 10 cases and abnormally low acid values or achlorhydria in 11 cases. Balfour and McCann reported that free hydrochloric acid was present in the gastric contents of 60 per cent of their patients. Madding and Walters reported an absence of free hydrochloric acid in 67 per cent of their cases of reticulum cell sarcoma. Yarnis and Colp reported that all of their cases tested had histamine anacidity. Of the 7 cases reported by McSwain and Beal<sup>14</sup> 4 had no free hydrochloric acid in the gastric contents.

### Special Diagnostic Methods

**Roentgenologic examination.** All of the 19 patients had roentgenologic examinations of the gastrointestinal tract. In a majority of cases

the diagnosis was carcinoma, or simply "neoplasm" of the stomach. Sarcoma was considered in only 2 cases. Case 4 was described as having multiple polypoid neoplasms of the stomach, probably leiomyosarcoma. The lesion was a lymphosarcoma of the lymphocytic type (malignant lymphocytoma). Case 8 was characterized at roentgenologic examination (fig. 2a) by hypertrophic gastric rugae and a large irregular ulcer crater on the anterior wall of the pars media of the stomach. The roentgenologic report included the phrase "exclude lymphosarcoma". At the time of these examinations there was no other clinical evidence or laboratory data to suggest that the lesions were sarcomas. In case 19 the lesion was first interpreted simply as a neoplasm. After roentgen therapy it diminished in size and was regarded as a lymphocytoma, and at gastroscopic examination it was also considered a lymphosarcoma (fig. 3). Metastatic nodules in the cervical region gave a clue to the diagnosis.

The most common and significant roentgenologic changes were hypertrophy of the gastric rugae (fig. 2a) in 6 cases, large irregular ulcerations (figs. 2a and 4a) in 6 cases, diffuse infiltration in 7 cases, and single or multiple polypoid neoplasms in 4 cases. A delay in gastric emptying time was uncommon, 80 per cent retention in four and one-half hours being present in 2 cases (fig. 3a).

Templeton<sup>19</sup> describes enlarged and stiffened folds resembling the rugal form of hypertrophic gastritis in 2 cases, large ulcerations resembling carcinoma in 1 case, and replacement of the normal mucosal

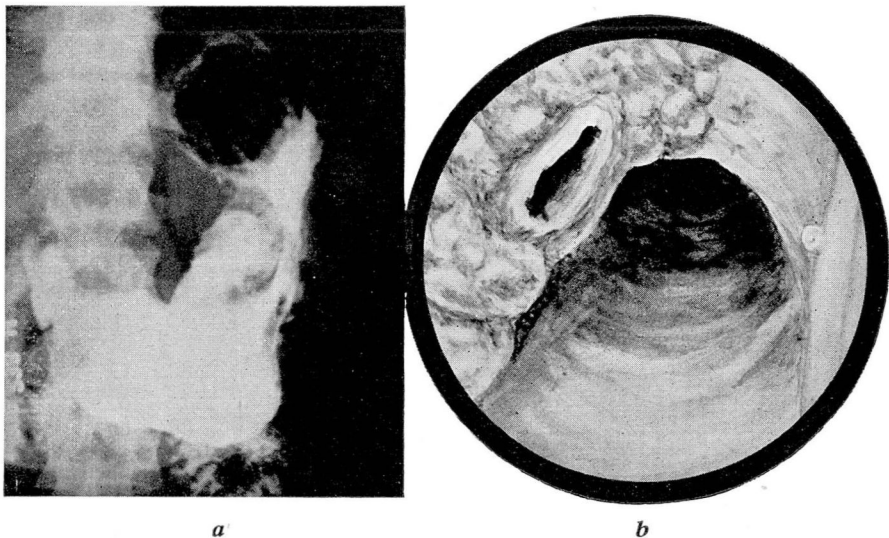


FIG. 2. Case 8. (a) Roentgenogram of stomach showing huge irregular ulcer crater of pars media with hypertrophy of the gastric rugae. (b) Gastroscopic picture showing large irregular ulcer crater with rolled, nodular margins, just proximal to the angulus.

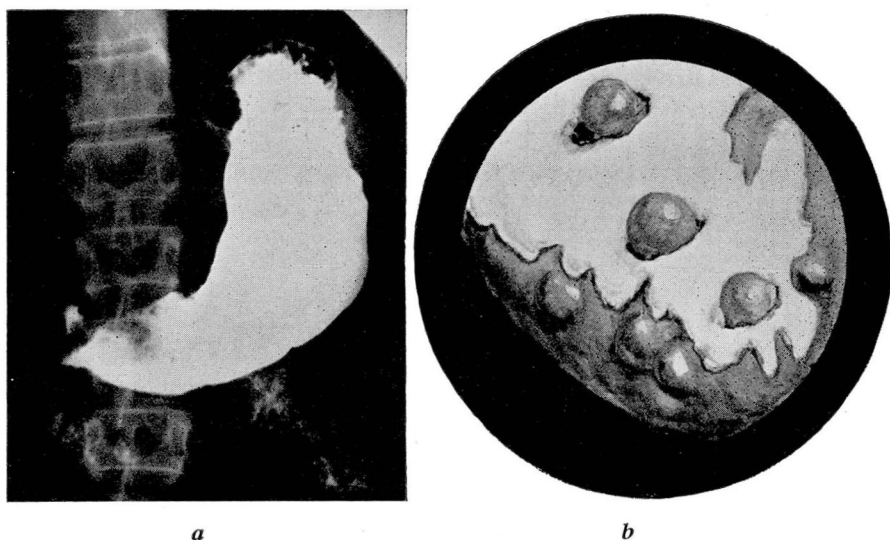


FIG. 3. Case 10. (a) Roentgenogram of stomach showing huge obstruction-filling defect of the pars pylorica. (b) Gastrosopic picture showing diffuse infiltrative lesion; mucosa covered by a thick adherent layer of gelatinous white secretion through which polypoid protuberances appear.

pattern by irregular polypoid tissue which stiffened the entire involved area and narrowed the lumen in 1 case.

Archer and Cooper report ulceration as the presenting roentgenologic sign in each of their 3 cases. They felt that hypertrophic gastric rugae have been overemphasized as a roentgenologic feature of gastric sarcoma.

Holmes, Dresser, and Camp<sup>20</sup> point out that, while the results of the roentgenologic and clinical examinations may be of considerable importance, they are not sufficiently characteristic to permit a definite diagnosis of lymphosarcoma of the stomach.

Rafsky, Katz, and Krieger made a diagnosis of lymphosarcoma of the stomach in 4 of 12 cases. They listed the common roentgenologic findings, emphasizing filling defects with smooth margins, diffuse types with rigidity of the walls and infiltration, pattern of giant rugae, and changes in size of the stomach. Gastric retention was an uncommon finding.

Feldman,<sup>21</sup> discussing roentgenologic differentiation of gastric carcinomas and sarcomas, pointed out that carcinomas more commonly affect the orifices than do sarcomas; that obstructive signs may occur early in carcinoma but are uncommon in sarcoma; and that the effacement of the gastric rugae which occurs commonly in carcinoma contrasts with the normal mucosal folds or hypertrophy of gastric rugae in sarcoma.

**Gastrosopic examinations.** Six of the 19 patients in this series had one or more gastroscopic examinations. In 3 cases the initial diagnoses were ulcerating carcinoma, ulcerating malignancy, and malignant gastric ulcer (figs. 2b and 4b). In case 1 the diagnosis was infiltrating neoplasm, and in another case (fig. 3b) the lesion was identified as a lymphosarcoma. In the latter case the gastroscopist was aided by the presence of metastatic growths in the cervical lymph nodes. The sixth patient was examined twice before the malignant nature of the disease was recognized. The initial diagnosis was benign gastric ulcer. Six weeks later on gastroscopic examination only a dimple was seen at the site of the ulcer and the lesion was thought to have healed. Eight months later there was recurrence of symptoms and the gastroscopic diagnosis was ulcerating carcinoma.

From the above experience it must be concluded that the diagnosis of sarcoma of the stomach can not be established by gastroscopic examination alone. No constant or even frequent appearance can be classified as characteristic of gastric sarcoma. However, the gastroscopic appearance of polypoid submucous tumors covered by relatively normal mucous membrane, diffuse infiltrative lesions, or ulcerative lesions covered by an adherent layer of white gelatinous secretion should suggest gastric sarcoma in the differential diagnosis.

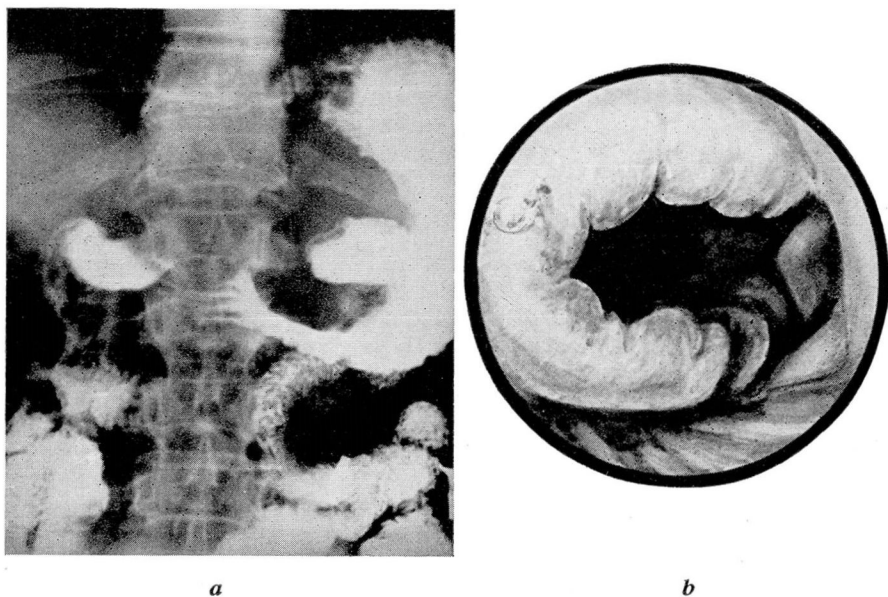


FIG. 4. Case 9. (a) Roentgenogram of the stomach showing diffuse infiltrative lesion with a large irregular ulcer on the lesser curvature. (b) Gastroscopic picture showing large ulcer on the lesser curvature just proximal to the angulus; edges rolled and nodular; base necrotic.

Renshaw,<sup>22</sup> while associated with Schindler, described a case of lymphosarcoma of the stomach and thought that gastroscopy could be of aid in establishing the differential diagnosis. The experience in this study is in keeping with the opinion of Bockus,<sup>7</sup> who says:

“Schindler described the gastroscopic appearance of the diffuse infiltrative type of lymphosarcoma, stating that the gastroscopic findings are ‘characteristic and cannot be mistaken for any other picture . . . the tremendous infiltration with protruding hemorrhages, numerous folds and nodules is almost pathognomonic’. That statement is more positive than the description justifies and I doubt that one could differentiate, by gastroscopy alone, diffuse sarcomatous invasion from a similar diffuse infiltrative type of carcinoma or possibly from leukemia or Hodgkin’s disease. Obviously it is impossible to differentiate the more circumscribed lymphosarcomas from gastric carcinomas. The number of gastroscopic observations do not, in my opinion, justify any definite statement concerning the value of gastroscopy in the differential diagnosis between sarcoma and other gastric tumors or invasive processes.”

Yarnis and Colp,<sup>17</sup> describing their gastroscopic experience with sarcoma of the stomach, thought that the most typical picture seen was that of large polypoid rugae covered by relatively normal mucous membrane. They said: “Gastroscopy may prove of definite diagnostic value especially in identifying the diffusely infiltrating type of numerous submucous tumors. The marked exaggeration of the rugae with ridge-like elevation and polypoid formation, and the presence of nodular tumors of varying size, covered by relatively normal mucous membrane or with the minimal degree of ulceration are rather characteristic. However, it is almost impossible to differentiate the ulcerative or localized polypoid tumors from other malignancies of the stomach, unless a biopsy is performed.”

In the cases of this series the “characteristic” picture was commonly observed. In addition, the presence of a “gelatinous-like” exudate (fig. 3b) partially covering ulcerative lesions was frequently noted. However, in several instances a similar picture was seen and the diagnosis of sarcoma was ventured, but histologically the lesions proved to be carcinomas. Of the gastroscopically-viewed gastric sarcomas reported in the literature, the majority were considered carcinomas, or there was some other evidence, such as a biopsy specimen or the presence of metastatic growths in lymph nodes, to aid the gastroscopist in making the diagnosis.<sup>13,14,16,17,23,24</sup>

Giere<sup>25</sup> reported a case in which the lesion was correctly diagnosed by gastroscopic examination one month after roentgen examination had failed to disclose any abnormality of the stomach.

It is interesting to note that among the 15 patients in this series who were operated upon, only 2 lesions were recognized as sarcoma from inspection of the gross material. This observation serves to emphasize the difficulties of recognizing these growths by roentgenologic or endoscopic examination.

### Treatment and Results (Table)

There is some difference of opinion as to the preferred method of treatment of sarcoma of the stomach. Some authors<sup>5,15</sup> believe gastric resection is the procedure of choice, particularly in the case of apparently localized or exogastric tumors. It is important to obtain material by biopsy in every case. Roentgen therapy may relieve symptoms and prolong life even in the "hopeless case".

Many lymphosarcomas are resectable and many others are responsive to irradiation therapy, so that the duration of life following the discovery of the lesion may be quite long. Bockus believes it quite possible that some cases of lymphosarcoma are actually cured. It is this more favorable therapeutic response of sarcomas, as compared to carcinomas, which emphasizes the importance of an early diagnosis.

All living patients in this series have been contacted within recent months. Two patients, both having been treated with a combination of operation and roentgen therapy, have survived five years without evidence of recurrence. Two patients have survived more than three years, again both having been treated with a combination of operative and roentgen therapy. Two patients have survived more than one year. One was treated by operation and subsequent irradiation, and the other patient, who had leiomyosarcoma, was treated by operation alone. The latter patient has evidence of a recurrence of the growth at present.

Three patients received only roentgen therapy, the longest survival being seventeen months.

From the literature Archer and Cooper collected 13 cases in which five-year survivals were obtained. Of these, 8 were treated by irradiation alone, 4 by a combination of operation and irradiation, and 1 by operation alone.

Madding and Walters<sup>6</sup> and Jenkinson<sup>26</sup> and Krumbhaar<sup>27</sup> have stressed the importance of differentiating the reticulum cell sarcomas from the malignant lymphocytomas because of the greater resistance of the reticulum cell type of lymphosarcoma to roentgen therapy. The group of patients with malignant lymphocytoma were found to have a better life expectancy. They point out that the life span was nearly identical in their patients treated by operation alone and those on whom irradiation therapy was used as an adjunct, adding that when comparing

TABLE

Case	Age	Sex	Type Lesion	Treatment	Time Followed	Result
1.	55	F	Lymphosarcoma (type undetermined)	Gastric resection and roentgen therapy	7 months	Died
2.	68	M	Lymphosarcoma (lymphocytic type)	None	13 days	Died
3.	55	M	Lymphosarcoma (lymphocytic type)	Total gastrectomy	5 weeks	Died
4.	63	F	Lymphosarcoma (lymphocytic type)	Total gastrectomy and roentgen therapy	1 year	Living & well
5.	50	M	Lymphosarcoma (reticulum cell)	Exploration; partial gastric resection; roentgen therapy (not completed)	7 years, 9 mo.	Living & well
6.	66	M	Lymphosarcoma (lymphocytic type)	Exploration and biopsy; roentgen therapy discontinued (poor condition)	1 month	Died
7.	64	F	Lymphosarcoma (reticulum cell)	Gastric resection (acute perforation) and roentgen therapy	1 day (postoperative)	Died
8.	27	M	Lymphosarcoma (lymphocytic type)	Roentgen therapy only	3 months	Died
9.	62	M	Lymphosarcoma (lymphocytic type)	Gastric resection and roentgen therapy	5 years, 6 mo.	Living & well
10.	55	M	Lymphosarcoma (lymphocytic type)	Roentgen therapy only	1 year, 5 mo.	Died
11.	52	M	Lymphosarcoma (reticulum cell)	Total gastrectomy	1 year	Died
12.	41	M	Lymphosarcoma (lymphocytic type)	Partial gastrectomy and roentgen therapy	3 years, 11 mo.	Living & well
13.	38	M	Lymphosarcoma (reticulum cell)	Gastric resection	1 month	Died (massive hemorrhage)
14.	56	M	Lymphosarcoma (type undetermined)	Gastric resection and resection of secondary neoplasm of ileum	2 weeks	Died (intestinal obstruction and peritonitis)
15.	46	M	Lymphosarcoma (type undetermined)	Gastric resection and roentgen therapy	3 years, 6 mo.	Living & well
16.	62	F	Leiomyosarcoma	Resection gastric neoplasm	2 years, 3 mo.	Living but has evidence of a recurrence; in poor condition
17.	44	M	Lymphosarcoma (lymphocytic type)	Gastric resection	1 week (postoperative)	Died (peritonitis)
18.	64	M	Fibrosarcoma	Exploration and biopsy	2 months	Died
19.	61	M	Fibrosarcoma	No therapy; biopsy obtained through an open esophagoscope	1 month (from time of first visit)	Rapid downhill course

survival rates it is necessary to consider that patients who have been treated by both irradiation and surgery were usually those with involvement of the lymph nodes.

Taylor states that the degree of radiosensitivity of the growth is not predictable from the study of the pathologic material.

Inspection of the table will reveal that in this series patients having a malignant lymphocytoma showed a more favorable therapeutic response.

### Summary and Conclusions

1. Nineteen proved cases of gastric sarcoma are presented. Each living patient has been contacted within recent months.

The pathology of gastric sarcoma is briefly discussed, and the histologic characteristics of the types included are briefly described (fig. 1.)

The clinical features of gastric sarcoma are described, and the frequency of a symptom-complex resembling peptic ulcer is emphasized. In these patients, demonstrable ulceration of the gastric mucosa was regularly associated with the presence of this ulcer-like syndrome. Mucosal ulceration and the associated symptom-complex was limited to the lymphosarcomas.

Emphasis should be placed on the fact that every patient presenting symptoms of peptic ulcer should have an x-ray examination before treatment is prescribed. It is not uncommon to see patients who have been placed on ulcer management without this examination. The symptoms may thus be relieved in a person who harbors an early sarcoma of the stomach. A gastroscopic examination is important when the roentgen examination discloses abnormal findings in the stomach.

The average duration of symptoms was 10.3 months.

The average age of patients in this series was 54.2 years, an unusually high figure when compared to those reported by many other authors. This finding indicates that gastric sarcoma must not be suspected in relatively young patients only.

Sarcoma of the stomach occurred predominately in the male sex.

Two patients had acute massive gastrointestinal hemorrhages. One patient suffered an acute perforation of a reticulum cell sarcoma of the stomach. These are uncommon complications of gastric sarcoma.

A palpable mass was present in only 25 per cent of gastric lymphosarcomas but was present in each of the 3 spindle cell myosarcomas.

2. All of the 19 patients had roentgen examinations. The most common and significant roentgenologic findings were hypertrophy of the gastric rugae, large irregular ulcerations, diffuse infiltration, and the presence of single or multiple polypoid gastric neoplasms. Although it is not possible to identify positively a gastric neoplasm as sarcoma by

roentgenologic study alone, the procedure appears to be the most valuable in endeavoring to differentiate between gastric sarcoma and carcinoma.

3. Six of the 19 patients had one or more gastroscopic examinations. The gastroscopic pictures commonly encountered in sarcoma of the stomach are described. The results of this experience indicate that while the malignant character of the lesion will be recognized in nearly all cases, it is not possible to differentiate between carcinoma and the various types of sarcoma of the stomach by gastroscopy alone. A positive diagnosis of gastric sarcoma can be made only by careful histologic examination.

4. The preferred method of treatment of gastric sarcoma remains undecided. Each patient presents an individual problem. When the patient has a localized lesion in the distal half of the stomach, discovered early, gastric resection alone may result in cure. When there are extensive lesions in the upper portion of the stomach it may be possible to procure a specimen for biopsy by esophagoscopy examination, using a small forceps longer than the esophagoscope. In this instance if microscopic examination reveals the presence of lymphosarcoma, roentgen therapy alone, rather than total gastrectomy, is the preferred therapy. When the initial examination reveals glandular metastases and microscopic examination of one of the glands reveals the presence of sarcoma, roentgen therapy may relieve symptoms and prolong life. Before concluding that "nothing can be done", other than using palliative therapy, a biopsy is of paramount importance.

The 2 patients in this series who have survived for more than five years without evidence of recurrence were treated with a combination of surgery and roentgen therapy, as were the 2 patients who are in good health more than three years after treatment was begun.

A follow-up report\* concerns a patient, previously reported as a nineteen-year surgical cure of gastric sarcoma, who was found to be in good health thirty-one years after operation.

Reports in the literature have stressed the greater resistance of reticulum cell lymphosarcomas to roentgen therapy, thus serving to emphasize the necessity of careful classification of these growths according to specific cell type as well as to histogenesis.

The more favorable therapeutic response of gastric sarcoma, as compared to carcinoma, is apparent throughout the literature. This stresses the importance of diagnosis of this uncommon lesion by explora-

\* In June, 1914, Dr. Frank E. Bunts operated upon a 10-year-old child with a small round cell sarcoma of the stomach. This case has been reported as the longest recorded survival (nineteen years).<sup>1,28</sup> The patient was contacted in May, 1945, thirty-one years after operation, at which time he was in excellent health. It was not possible to obtain pathologic material for review at this time.

tory laparotomy and biopsy, by biopsy of available metastatic lesions, or in occasional cases by a biopsy obtained through an open esophagoscope.

### References

1. Collins, E. N., and Carmody, M. G.: Lymphosarcoma of stomach; report of 4 cases. *Am. J. Digest. Dis. and Nutrition*. 3:884-888 (Feb.) 1937.
2. Collins, E. N.: Sarcoma of stomach; report of case. *Cleveland Clin. Quart.* 2:59-62 (April) 1935.
3. Ewing, J.: *Neoplastic Diseases*, ed. 4 (Philadelphia: W. B. Saunders Co., 1940).
4. Goldblatt, H.: Personal communication.
5. Pack, G. T., and McNeer, G.: Sarcoma of stomach; report of 9 cases. *Ann. Surg.* 101:1206-1224 (May) 1935.
6. Madding, G. F., and Walters, W.: Lymphosarcoma of stomach. *Arch. Surg.* 40:120-134 (Jan.) 1940.
7. Bockus, H. L. (editor): *Gastro-Enterology I*. (Philadelphia: W. B. Saunders Co., 1943).
8. Fenwick, W. S.: Primary sarcoma of stomach. *Lancet* 1:463, 1901.
9. Balfour, D. C., and McCann, J. C.: Sarcoma of stomach. *Surg., Gynec. and Obst.* 50:948-953 (June) 1930.
10. O'Donoghue, J. B., and Jacobs, M. B.: Lymphosarcoma of stomach; report of case with some clinicopathological notations. *Am. J. Surg.* 58:246-253 (Nov.) 1942.
11. Finlayson, J.: Case of sarcoma of stomach in a child aged 3½ years. *Brit. M. J.* 2:1535, 1899.
12. Hunt, V. C.: Partial gastrectomy for lymphosarcoma in childhood. *Ann. Surg.* 96:210-214 (Aug.) 1932.
13. Rafsky, H. A., Katz, H., and Krieger, C. I.: Varied clinical manifestations of lymphosarcoma of stomach. *Gastroenterology* 3:297-305 (Oct.) 1944.
14. McSwain, B., and Beal, J. M.: Lymphosarcoma of gastrointestinal tract; report of 20 cases. *Ann. Surg.* 119:108-123 (Jan.) 1944.
15. Archer, V. W., and Cooper, G., Jr.: Lymphosarcoma of stomach; diagnosis and treatment. *Am. J. Roentgenol.* 42:332-340 (Sept.) 1939.
16. Taylor, E. S.: Primary lymphosarcoma of stomach. *Ann. Surg.* 110:200-221 (Aug.) 1939.
17. Yarnis, H., and Colp, R.: Lymphosarcoma of stomach. *Gastroenterology* 1:1022-1039 (Nov.) 1943.
18. Koucky, J. D., Beck, W. C., and Atlas, J.: Acute perforation of lymphosarcomatous ulcer of stomach; report of case. *Ann. Surg.* 114:1112-1116 (Dec.) 1941.
19. Templeton, F. E.: *X-ray examination of stomach*. (Chicago: Univ. Chicago Press, 1944).
20. Holmes, G. W., Dresser, R., and Camp, J. D.: Lymphoblastoma; its gastric manifestations, with especial reference to roentgen findings. *Radiology* 7:44-50 (July) 1926.
21. Feldman, M.: *Clinical Roentgenology of the Digestive Tract*, ed. 2 (Baltimore: Williams and Wilkins, 1945).
22. Renshaw, R. J. F.: Lymphoblastoma of stomach; report of case, with especial reference to gastroscopic appearance. *J.A.M.A.* 107:426-428 (Aug. 8) 1936.
23. Paul, W. D., and Parkin, G. L.: Lymphosarcoma of stomach; gastroscopic report. *Gastroenterology* 3:214-217 (Sept.) 1944.
24. Buschke, F., and Cantril, S. T.: Secondary lymphosarcoma of stomach. *Am. J. Roentgenol.* 49:450-454 (April) 1943.
25. Giere, C. N.: Lymphosarcoma; diagnosed gastroscopically. *J.A.M.A.* 117:173-175 (July 19) 1941.
26. Jenkinson, E. L., Kinzer, R. E., and Brown, W. H.: Lymphosarcoma, with special reference to reticulum cell type. *Am. J. Roentgenol.* 48:433-439 (Oct.) 1942.
27. Krumbhaar, E. B.: Lymphomatoid diseases (so-called lymphoblastomas). *J.A.M.A.* 106:286-291 (Jan. 25) 1936.
28. Jones, T. E., and Carmody, M. G.: Lymphosarcoma of stomach; report of case with 19 year surgical cure. *Ann. Surg.* 110:1136-1138 (April) 1935.