SARCOMA OF THE STOMACH *

WITH REPORT OF THREE CASES

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Although carcinoma is of common incidence, primary sarcoma of the stomach is one of the most unusual forms of neoplasm occurring in that viscus. Its literature is, therefore, largely made up of isolated case reports with but few special articles, and little or nothing is found in most text-books on this subject. Having had the opportunity of operating on three cases, my interest was stimulated to a search of the literature, and to make an attempt to gather therefrom some knowledge of the surgery of this disease. This, with the three case reports, is the basis of this paper.

Frequency of Occurrence.—Fenwick, in 1902, stated that sarcoma occurred in 5 to 8 per cent. of stomach tumors. Yates, in 1906, 2 per cent., based on records of 800 cases of tumor of the stomach. Ewing, in 1919, gives 1 per cent. Smithies and Ochsner, in 1919, in an analysis of 921 cases of cancer of the stomach, found but 4 cases of sarcoma. Ziesche and Davidsohn, in 1909, from the statistics of various German operative clinics and autopsies estimate 1 per cent. Two of the cases here reported are the only cases of sarcoma of the stomach to be found in the operative records of Bellevue Hospital. During the period from January 1, 1911, to July 1, 1919, eight and one-half years, there were 702 cases diagnosed as carcinoma of the stomach on discharge from Bellevue Hospital. As there were only 97 operations for carcinoma of the stomach and the percentage of autopsies was small, there is the possibility that several of these cases were incorrectly diagnosed. It is of interest to note that of the 97 operative cases of carcinoma, 48, or nearly 50 per cent., died while still in the hospital. The other case of sarcoma of the stomach here reported is the only one from the surgical records of St. Luke's Hospital, N. Y.

Age.—The average age of incidence of carcinoma of the stomach, according to the United States Census report of 1911, was 61.2 years. Sarcoma, however, as a rule, occurs in younger patients. Ewing states that lymphosarcoma occurs chiefly in young subjects. The age of the patients with sarcoma reported in the literature ranged from three and one-half to ninety-one years. In a series of 150 cases reported by Ziesche and Davidsohn in 1909, in 118 of which the age was given, the age by decades was first decade, 3; second, 11; third, 18; fourth, 15; fifth, 29; sixth, 24; seventh, 12; and eighth, 6. The average age being 41.6. In a smaller series reported by Burgaud in 1908 the results by decades were practically the same.

Forni estimates the period of greatest frequency of occurrences of sarcoma of the stomach as forty to sixty. The average age for lymphosar-

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coma is given as thirty-six years. In the cases of my own three patients the ages were thirty-six, thirty-eight, and forty-one years.

Sex.—The sex of the patients has been almost equally divided in the reported cases.

Etiology.—Ewing states: "The occurrence of atypical productive inflammatory lesions must be regarded as fully in accord with established views regarding the nature of sarcoma; that is, the inflammatory origin of sarcoma, especially lymphosarcoma." He quotes Moser and Kehr that "sarcoma may follow ulcer appears possible, but this relationship has not been satisfactorily proven." This relationship is denied by Lecène and Burgaud, and Levine writes: "Lymphosarcoma is only a manifestation of a systemic disease which embraces the whole lymphoid system. A discrete tumor of lymphosarcoma is always surrounded by diseased lymphoid tissue, and the operation is followed not by a recurrence, but by the development of the latter tissue into new tumors." This latter statement would appear to be effectually disproven by the number of cases which have survived operation for a considerable time—one case reported as being without recurrence fourteen years after operation. In the specimen shown in the illustration it appeared by gross examination as if the large sarcomatous ulcer had originated from the edge of an older cicatrizing ulcer near the pylorus, but this was impossible to prove by microscopical examination.

Pathology.—Sarcoma of the stomach may be divided into three distinct groups of cases: (1) Spindle-cell myosarcoma; (2) lymphosarcoma; (3) miscellaneous round-cell or lymphosarcoma, the nature of which is uncertain. They may be diffuse, involving the whole stomach, or form large masses or be polypoid. Cantwell removed one weighing 12 pounds. Barrington Ward reports a case in which the mass projected into the stomach cavity near the pylorus in such a manner as to obstruct the exit of the stomach. A considerable number of cases are reported as exogastric tumors. They have, therefore, been classified by Burgaud as exogastric, endogastric, and infiltrating.

As the round-cell variety and lymphosarcoma originate in the submucous layer and the spindle cell in the muscular layer, ulceration does not occur as readily as in carcinoma, which originates in the epithelial layer. Lymphosarcoma and the round-cell variety are usually infiltrating, while the spindle cell or myosarcomata form discrete tumors which may either be sessile or peduncleated and often grow to a large size. At a recent meeting of the New York Pathological Society Pagenstecher showed a specimen of myosarcoma which weighed 11 pounds. Cystic degeneration of these larger tumors not infrequently occurs.

Concerning the relative frequency with which the various forms of sarcoma occurred, Forni, in an analysis of 200 cases, in 190 of which the variety of the lesion was noted, found round-cell (including lymphosarcoma) in 98, spindle-cell in 39, polymorphous structure in 14, and special forms as

angio or myosarcoma in 39. According to Hesse, perforation occurs in 8 per cent. of the cases.

Round-cell and lymphosarcomata increase more slowly in size than spindle-cell, and, judging from the statistics of the progress of the disease, cases of sarcoma of the stomach metastasize less rapidly than carcinoma, and the length of life after the appearance of the disease in non-operative cases appears to be longer than in carcinoma cases. Therefore, operative results should afford a better prognosis than in carcinoma ventriculi.

It would appear that a benign tumor, as a leiomyoma, may exist for years, grow slowly, and then become sarcomatous. Kimpton reports such a case in a woman of thirty, in whom he resected the stomach for a round-cell sarcoma. The patient stated that she first noticed the tumor when she was eleven years old.

Metastases.—While forming less rapidly than in carcinoma, metastases, when they do occur, are most frequently found in the lymph-nodes in relation to the stomach, and secondly in the liver, as occurs in carcinoma. In only one of my three cases, Case I, were the glands involved, in which instance they were of considerable size, and of a consistency and appearance that made the operative diagnosis of sarcoma probable.

Location of the Lesion.—An analysis of 146 cases in which the location of the lesion was given, published by Flebbe in 1913, showed it to be located at the pylorus in 37; greater curvature, 30; posterior wall, 26; lesser curvature, 13; anterior wall, 8; cardia, 3; pylorus and both curvatures, 2; while in 27 cases almost the entire stomach was infiltrated.

Symptomatology.—As a rule, a previous history of gastric disturbance is absent in sarcoma of the stomach. Pain is the most constant symptom and is present in most cases; but the amount of pain as with the other symptoms would appear to depend somewhat on ulceration. Vomiting, and especially hæmatemesis, is less frequent than in carcinoma, and as the growth does not so often affect the pylorus, or even if in the pyloric region, is not as apt to cause stenosis as is carcinoma, the symptoms of pyloric obstruction are not so common. Cachexia develops more slowly than in carcinoma, but anæmia is mentioned as a frequent symptom. In none of my three cases was the latter of prominence. The presence of an inflammatory leucocytosis has also been recorded. Albumen in the urine is mentioned as one of the occasional symptoms. This is explained by the presence of metastases in the kidney and therefore would not be a symptom of a stomach sarcoma, and if not due to coincident nephritis, would contraindicate operation. When the growth is infiltrating a mass may not be felt, but in some of the infiltrating cases and many others a palpable tumor is present, especially in the case of exogastric tumors, which grow to a large size. In one of my cases, although the tumor was of the infiltrating lymphosarcoma type, the mass formed by the enlarged glands could be palpated before operation. Schlesinger states that an enlargement of the spleen is found in 10 per cent. of the cases of sarcoma

of the stomach, especially in lymphosarcoma, although this is not necessarily due to metastasis.

The examination of the gastric contents in carcinoma usually shows the absence of free hydrochloric acid. This, while not absolutely diagnostic, is of aid in making the diagnosis. In sarcoma free hydrochloric acid is apt to be present, although frequently absent. In both of my cases in which a gastric analysis was done free hydrochloric acid was present in the expressed test meals. Blood in the stomach contents or stools is not as frequently found as in carcinoma. Occasionally cellular elements from the tumor may be found in the return from a test meal or gastric lavage which would indicate the presence of sarcoma.

Radiographic Examination.—Although a positive diagnosis of sarcoma could not possibly be made by a radiographic examination, the X-ray is the greatest aid we have in making a diagnosis of the presence of an operative lesion. Deformity of the stomach, filling defects, irregularity of the outline, interference with the peristaltic waves, the relation of the stomach to an exogastric tumor, all point to a necessarily operative condition, which, after all, is the closest we can hope to come in the preoperative diagnosis of most gastric disorders.

It has been suggested that an infiltrating tumor may be diagnosed by a fluoroscopic examination demonstrating the inability of pressure with the hand to indent the infiltrated stomach wall. Also where so large a portion of the stomach is shown to be infiltrated that operative cure is impossible, the careful radiographic examination can prevent unnecessary surgery in a hopelessly inoperable case. In two of my cases which were radiographed, a radiographic diagnosis of ulcer was made in one and of carcinoma in the other.

Cases Reported in the Literature.—In the 150 cases reported by Ziesche and Davidsohn in 1909, the majority were from autopsy reports; there were 52 operative cases. Of these 31 were exogastric tumors. In 25 of these resection of the tumor was reported, 7 died as a result of operation, 11 recovered, but no subsequent report was made, while 7 were reported well three months to three years after operation. In the other 6 exogastric tumors, where operative procedure other than resection was resorted to, all died. Of 21 gastric tumors, 12 were resected and 5 died. Of 5 that recovered there were no subsequent reports and two were reported well, one case a year, and the other four years after operation.

In 9 gastric tumors in which resection was not performed, 4 being gastroenterostomies and 5 exploratory laparotomies, all died. Thus there were 37 resections of which 25 recovered, a mortality of 32 per cent.

Frazier, in 1913, reported 28 operative cases. Of these 11 correspond to Ziesche and Davidsohn's list of operations, one of them being an exploratory laparotomy. There are 17 additional cases in Frazier's list, 7 of which were reported subsequent to Ziesche and Davidsohn's paper. He does not include, however, 16 exogastric resections, 11 resections of gastric tumor,

and 14 cases, operated on by other methods than resection, in the list of Ziesche and Davidsohn. This makes a total of 69 operations and 54 resections up to 1913. It is of interest to report here that one of these patients in Frazier's list operated on by Moschowitz in 1909 died in 1919 of another disease with no signs of recurrence of the sarcoma. Kimpton has recently reported a case without recurrence five years and ten months after operation for round-cell sarcoma; and the case reported by Rupert operated on by Schopf was well fourteen years after operation. The most complete analysis of the largest number of cases that I have been able to find in the literature is that of Forni, published in 1914, who brought the list of reported cases up to 200. A complete bibliography is included in his report.

Since the report of this group of cases the following cases have been reported, or were not included therein:

HUNTINGTON: Woman, aged 67 years, fibrosarcoma, size of cherry, originating in pyloric region. Resection of pylorus. Reported well two months later.

MAYO, W. J.: Man, aged 38 years, resection of stomach for tumor size of head lying in pelvis. Recovery. Death in six months from recurrence.

MAYO, C. H.: Man, aged 43 years, intrinsic myxosarcoma. Patient well at end of one year.

MEDINA AND EGANA: Man, aged 37 years, fibrosarcoma of lesser curvature and posterior wall with pylorus intact. Resection, with anterior gastro-enterostomy. Patient well one and a half years later.

BARRINGTON, WARD: Man, aged 25 years, round-cell sarcoma, size of fist, growing from pyloric region in stomach. Successfully resected.

FRITZESCHE: Reports a case of sarcomatous leiomyoma of the stomach operated on by Quervain, which had perforated, the tumor originating from the greater curvature.

HARTZ: Man, aged 41 years, round-cell sarcoma of the anterior wall and lesser curvature of the stomach. Exploratory laparotomy by Montgomery. Died sixteen days later.

KIMPTON: Woman, aged 30 years. Multiple pedunculated round-cell sarcoma, involving pyloric end of stomach. Well five years ten months after resection.

SCHLESINGER: Boy, aged 17 years, operated by Föderl. Lymphosarcoma of pylorus. Resection; recovery. Man, aged 32 years, lymphosarcoma of cardia and posterior wall. Extensive metastasis. Exploratory laparotomy. Man, aged 66 years, diffuse lymphosarcoma, involving middle of stomach between cardia and pylorus. Extensive metastasis. Exploratory laparotomy.

Seven cases are reported from autopsy records. Two by Warner, both of which were leiomyosarcoma, one from the greater curvature and the other from the pyloric region. One of fibromyxosarcoma, by Rohdenburg, and one of myosarcoma which weighed eleven pounds, by Pagenstecher. Two by Giacoma, one of which, a man aged 65 years, had a round-cell infiltrating submucous tumor forming several polypoid masses, the other a woman, aged 91 years, with a round-cell sarcoma infiltrating the pylorus. Saito reports the autopsy on a woman, aged 27 years, with an infiltrating tumor of the lesser curvature from the pylorus to the cardia, which showed mixed tissue elements of myxosarcoma and carcinoma cells, or a true carcinosarcoma.

In addition to these 18 cases, 7 cases from the literature not included in the list of Forni collected by Medina and Egana, and the 3 cases of resection reported by the writer, making a total of 228, there are articles and case reports noted in the Index Medicus for 1914 to 1919 by Burty,

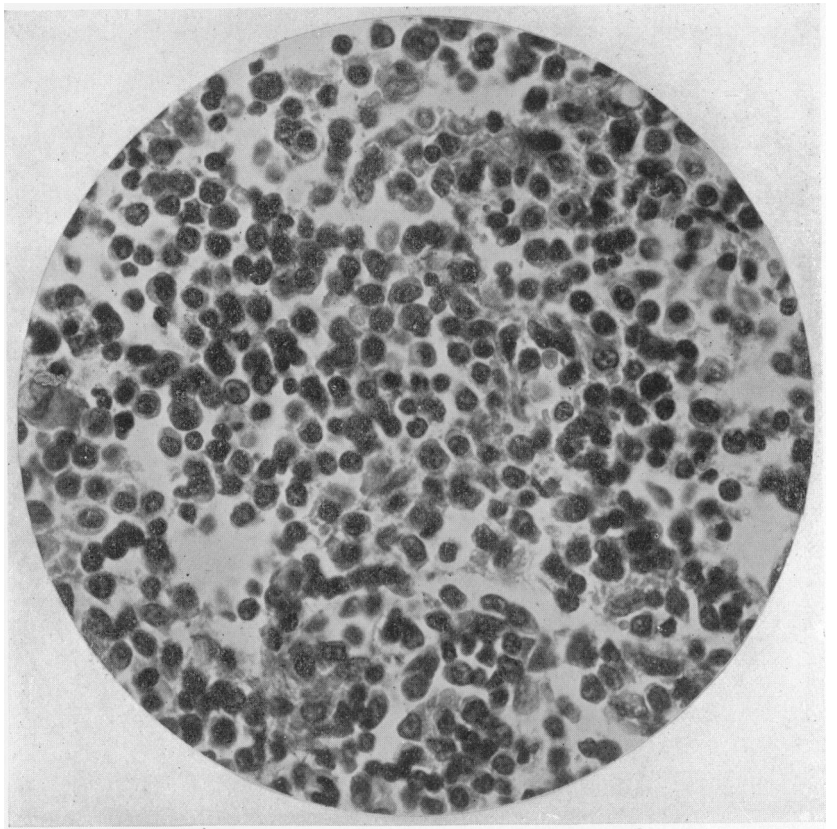

FIG. 1.—Case I. Sarcoma of stomach. Section through tumor. × 600.

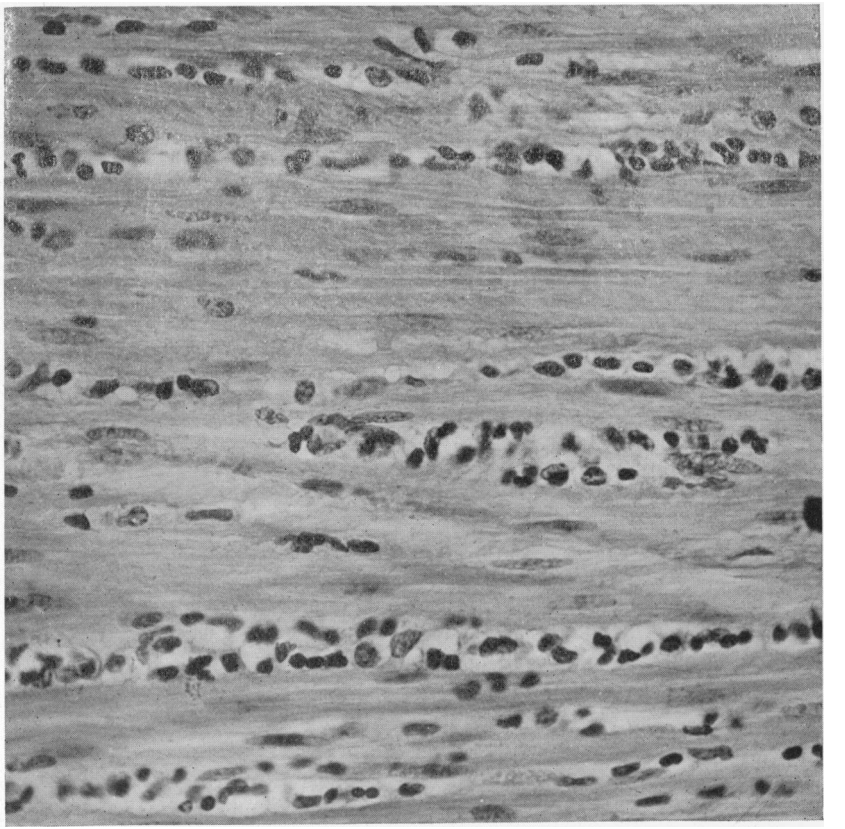

FIG. 2.—Case I. Sarcoma of stomach, showing infiltration of stomach walls with tumor cells. × 600.

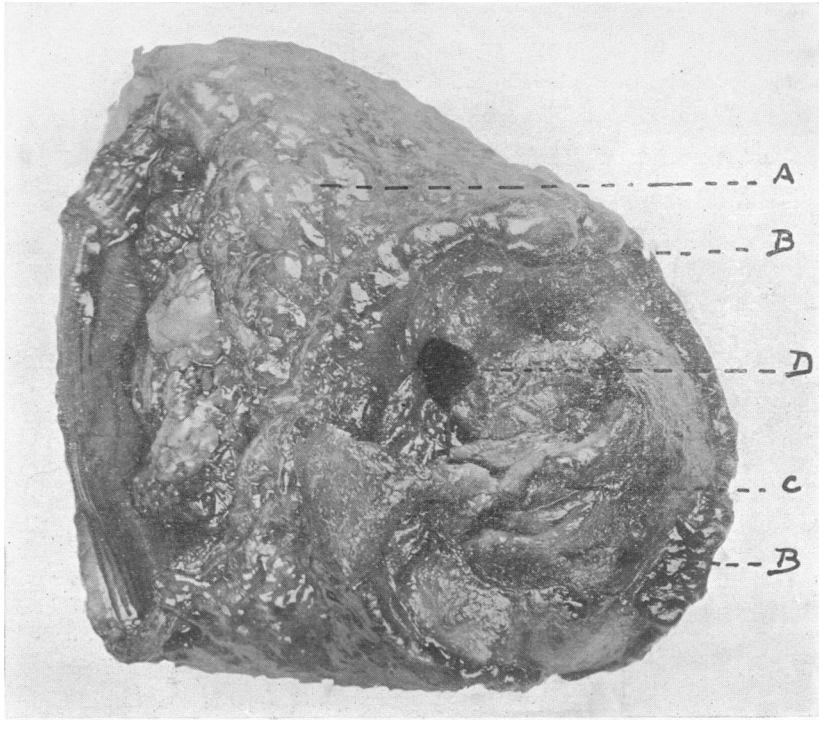

FIG. 3.—Case III. Section of stomach removed, showing sarcomatous ulcer.

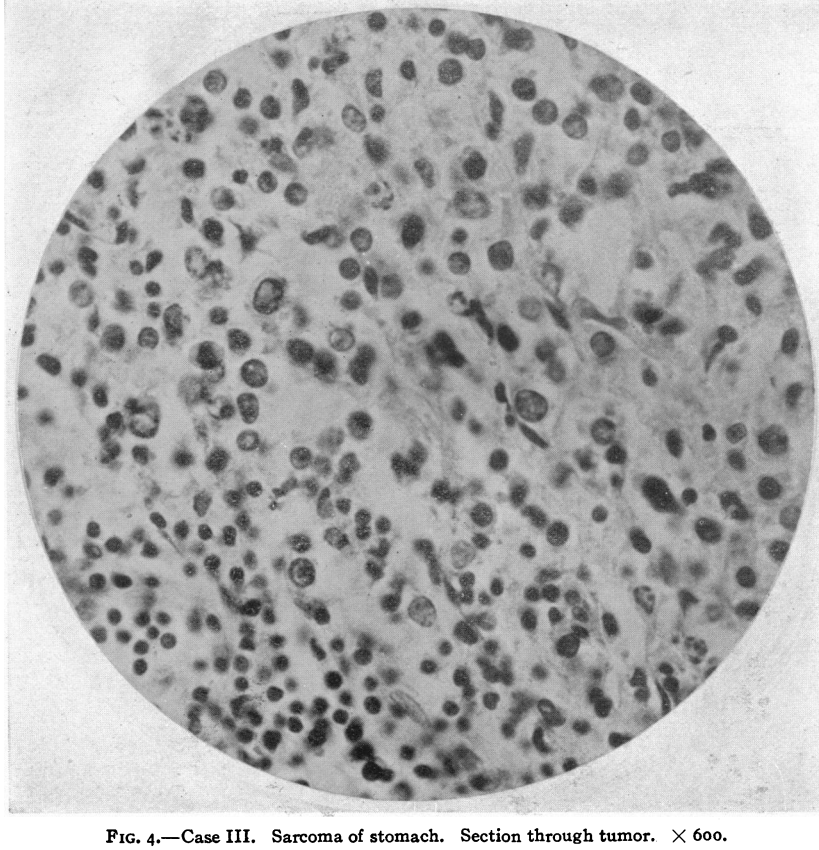

FIG. 4.—Case III. Sarcoma of stomach. Section through tumor. × 600.

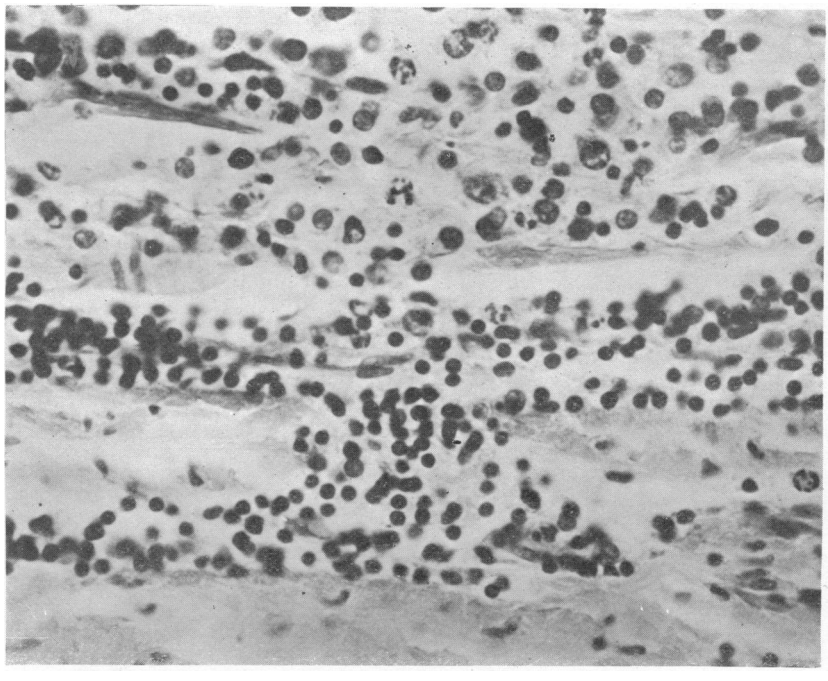

FIG. 5.—Case III. Sarcoma of stomach, showing infiltration of stomach wall with tumor cells. ×600.

Geymuller, Hesse, and Koettlitz, but none of the journals containing these articles are at present obtainable at the New York Academy of Medicine. The articles by Burty and Köettlitz are each reports of one case, making 230 cases reported in all.

The following is a brief report of the three cases reported on by the writer of this paper:

CASE I.—Woman, aged thirty-eight years, admitted to St. Luke's Hospital May 27, 1917. Had an appendectomy four years ago for symptoms of indigestion which were not relieved by the operation. Symptoms have been worse for past six months when she developed pain in the right hypochondrium made worse by eating.

Examination revealed an irregular mass in the right hypochondrium. No radiograph examination or gastric analysis was done as a preoperative diagnosis of cholecystitis was made. At operation the pyloric end of the stomach was found greatly infiltrated, the wall measuring 1.5 cm. in thickness. There were a number of enlarged white lymph-nodes along the greater curvature, the largest of which was 2.5 by 2 cm. in diameter. The pyloric third of the stomach was resected, an operative diagnosis of sarcoma being made. Operation was difficult on account of the large blood-vessels about the stomach and glands. The patient died of hemorrhage and shock the following day. "Examination of the specimen showed lymphosarcoma in the stomach and glands" (Figs. 1 and 2) (Dr. F. C. Wood). Mucous membrane not ulcerated.

CASE II.—Woman, aged forty-one years, admitted to Bellevue Hospital on July 24, 1917. Had been operated on one year previously for a gynæcological condition. Had belched gas after meals for two years. Had lost 40 pounds in weight in last year. Pain in epigastric region and occasional vomiting for past few weeks. Gastric analysis after Ewald meal showed total acidity of 38. No free hydrochloric acid, lactic acid, blood or bile. After a Boas meal free hydrochloric acid was present. Urine examination, blood examination, and Wassermann negative. X-ray examination indicated the presence of ulcer of the pylorus. No mass could be felt.

At operation an infiltration of the pyloric end of the stomach was found. It was not adherent and the glands were not enlarged. A resection of the pyloric third of the stomach was done by the Billroth No. 2 method. The patient made a good recovery from the operation. She was allowed up in a chair sixteen days after operation with the wound healed, but she did not regain strength and vomited at times. Her mind was cloudy and the patient died twenty-three days after operation.

Pathological Diagnosis.—Lymphosarcoma of stomach (Dr. Chas. Norris).

CASE III.—Man, aged thirty-six years, admitted to Bellevue Hospital September 22, 1918.

Had been operated on in another hospital one year previously for varicose veins of the legs. No history of gastric disorder pre-

vious to three months before admission, when he began to have pain and distress in his epigastrium and right hypochondrium, at first in no relation to meals, later after eating. Did not vomit until two nights before admission. Had lost 15 pounds in weight.

Gastric Analysis.—Total acidity, 22; free hydrochloric acid, 16; lactic acid, 0; urine, negative. Blood examination: Red blood-cells, 4,422,000; hæmoglobin, 78 per cent.; white blood-cells, 11,000; polynuclear cells, 77 per cent.

X-ray examination revealed a marked deformity of the stomach, a diagnosis of perforating carcinomatous ulcer being made.

At operation a large callous ulcer of the posterior wall was found which had perforated and was adherent to the pancreas (Fig. 3). There were no enlarged glands. The stomach was separated from the pancreas with difficulty and resection of one-third of the stomach by the Billroth No. 2 method was done. Examination of the specimen showed lymphosarcoma (Figs. 4 and 5) (Dr. Douglas Symmers). The detailed report by whom is here given:

"Microscopic examination of the stomach shows the presence of extensive necrosis of the mucous membrane. The muscular wall is enormously infiltrated and destroyed by cells, some of which are the type of small lymphocytes, but most of which are apparently large lymphocytes.

"Assuming that the blood was examined during life and that no evidences of lymphatic leukæmia were detected, the best interpretation of the histological findings would appear to be that of a growth belonging in the category of the lymphosarcomata.

"In this connection it is interesting to recall that the stomach is occasionally the seat of a growth of similar histological appearances which, after the lapse of a certain length of time, suddenly commences to pour its cells into the blood stream, constituting a true leucæmia. The latter phenomenon is rapidly followed by death. This is the so-called leucosarcoma of Sternberg. It is possible that this case is an example of this lesion. It is likewise interesting to note that there are varieties of lymphosarcoma which, after attaining relatively enormous proportions, undergo involution and disappear either spontaneously or under the influence of such applications as radium or the X-ray. Thus the lymphosarcomata vary greatly in malignancy."

The patient made an excellent recovery and has no symptoms of recurrence sixteen months after operation.

SUMMARY

Sarcoma of the stomach occurs in 1 per cent. of all stomach tumors. The average age of incidence is 41.6, in contrast with an average age of 61.2 for carcinoma. The average age for lymphosarcoma is earlier than in the other forms.

Round-cell and lymphosarcoma are the most frequent forms found. They are more apt to be infiltrating, but the round-cell may project into

the stomach or form peduncleated tumors. They result in ulceration oftener than in other sarcomata, but not as frequently as in carcinoma. Spindle-cell and myosarcoma are apt to form large exogastric tumors. While statistics show that the most common site is in the region of the pylorus, especially in the infiltrating form, other portions of the stomach are more frequently involved, and the pylorus itself is less often attacked or obstructed than in carcinoma. Metastasis also occurs less rapidly than in the latter, and the operative prognosis should therefore be better.

The diagnosis can rarely be made with certainty; the X-ray examination furnishes the most useful evidence. When in the presence of a tumor in a patient younger than those in which cancer is usual a short history of gastric disturbance, absence of blood in the gastric contents and stool, and the presence of free hydrochloric acid, the absence of cachexia, and the presence of anæmia, while not ruling out cancer, ulcer, or syphilis of the stomach, may cause the diagnosis of sarcoma to be considered.

The total number of authenticated cases now recorded is brought up to 230 with a probable larger number on record, the reports of which are not now available. To the number of operative cases, in addition to the 69 previously reported in the lists of Ziesche and Davidsohn and of Frazier, may be added the 8 cases from the literature collected by Medina and Egana, one case in this list being reported by Forni, but not included in the operative list, one case by Forni, the additional 11 reported in this paper, and the 3 cases of the writer, a total of 92 operative cases, of which 69 were resections either of the exogastric tumor or of part of the stomach and 23 were either gastroenterostomies or exploratory laparotomies.

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