TUBERCULOUS ULCER OF THE STOMACH, WITH REPORT OF A CASE.*

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According to Boas, three forms of tuberculosis of the stomach may be distinguished: the tuberculous granulomata (the rarest form), miliary tuberculosis of the gastric mucous membrane (the most frequent form), and finally tuberculous ulcer of the stomach.

The comparative rarity of tuberculous ulcer of the stomach may be gathered from the following facts: Hamilton,¹ in a careful study of the reported cases, was able to collect but 15 positive and 9 doubtful. Blumer² collected but 30 reliable instances. Arloing,³ in his classic thesis, gives 147, but he was not so discriminating as the writers mentioned above and included a number which they had rejected. In view of the generally accepted fact that tuberculosis of the stomach is practically always secondary to a tuberculous process elsewhere, the autopsy records on tuberculous patients is of value here:

Simmonds	8 cases in 2,000 autopsies.
Steiner and Neureutter	4 cases in 302 autopsies.
Widerhofer	2 cases in 418 autopsies.
Soltan Fenwick	2 cases in 2,000 autopsies.
Papavoine	1 case in 50 autopsies.
Villegk	5 cases in 1,317 autopsies.
Barthez and Rilliet	6 cases in 141 autopsies.
Müller and Hecker	8 cases in 297 autopsies.
Gerhardt	2 cases in 418 autopsies.
Still	5 cases in 226 autopsies.

43 cases in 7,169 autopsies = 0.7 %.

It would appear from Arloing's collected figures that tuberculosis of the stomach is more common in general miliary tuberculosis than in the chronic forms; thus Simmonds, among 100 cases of general miliary tuberculosis, found one instance where the stomach had been attacked. Frerichs noted 3 among 30 cases of miliary tuberculosis and only 7 in 250 of the chronic form.

* Read before the Medical Society of the District of Columbia, February, 1908.

1. Bull. Johns Hopkins Hosp., April, 1897, p. 75.

2. Albany Med. Ann., 1898, p. 145.

3. Thesis, Lyons, 1902-3.

As to whether tuberculous lesions of the stomach are more common in children or in adults, we may again borrow from Arloing. His collected figures show that in 2,115 autopsies on tuberculous children there were 38 instances of stomach involvement (1.7 per cent.), while in 4,917 autopsies on tuberculous adults there were but 23, or 0.45 per cent. In spite of these figures, this author is of the opinion that the condition is more often seen in adults.

As to the favorite location of the ulcers there is some difference of opinion. Ricard and Chevrier,⁴ from their collection of statistics, found that the pyloric region extending one or two centimeters from the opening was involved in about 35 per cent. of the cases; then the greater curvature, 20 per cent.; then the posterior surface, the lesser curvature, the anterior surface, and the subcardiac region. Tripier would place the lesser curvature immediately after the pylorus in frequency of involvement. The apparent preference for the pyloric end of the stomach has been explained by Virchow and Rokitsansky as due to the more numerous lymphatic follicles in this locality.

HISTORIC DATA.

The first mention of tuberculous ulcer of the stomach is said to have been made by Andral and Cruveilhier in their treatise on pathologic anatomy in 1842. Since that time brief reference has been made by various authors of text-books to this condition. Bignon in 1853 published the first detailed account of a case of tuberculous ulcer of the stomach. Litten and Talamon in 1879 reported cases in which giant cells were found in microscopic examination of sections from ulcers. Coats⁵ in 1886 inaugurated a new era by demonstrating the specific bacilli in the lesions. Musser's⁶ case, the report of which appeared in 1890, was the first published in America in which Koch's bacilli were found.

In looking up cases recorded as tuberculous ulcers of the stomach, one is confronted with the difficulty of determining their authenticity. At the risk of excluding some in which there is little doubt as to the genuineness, it would seem best to accept only those in which a microscopic examination shows either a typical tuberculous picture or the tubercle bacilli in the walls of the ulcer. This careful scrutiny seems the more necessary when we realize that the generally anemic and depraved physical condition of tuberculous patients renders them exceptionally good subjects for simple ulcer of the stomach. It is very likely

4. *Rev. de chir.*, 1905, xxxi, pp. 74 and 557.

5. *Glasgow Med. Jour.*, 1886, xxvi, p. 53.

6. *Phila. Hosp. Rep.*, 1890, i, p. 117.

that not a few phthisical patients suffer from peptic ulcers and the finding of the bacilli on the surface of such ulcers is no proof of their being truly tuberculous, as shown by Blumer and Happel's⁷ case of pulmonary tuberculosis associated with round ulcer of the stomach.

MODE OF INFECTION.

There are four avenues by which tuberculous infection might reach the stomach, viz.: by direct infection of the mucous membrane, through the lymphatics, through the blood stream, and through the serous coat.

The first-mentioned mode of infection might appeal to us strongly because of the apparent ease with which the bacillus might be brought in contact with the mucous membrane of the stomach by the swallowing of infected sputum by those whose lungs are tubercular, and in infected food, but the best authorities do not consider this the usual manner. Arloing,³ in his experiments on dogs, was unable in a single instance to produce ulcer of the stomach by administration of infected materials, his experiments including mechanical irritation and devitalization of areas of the mucosa by ligation of vessels and alterations in the chemical reactions of the gastric juice.

Through the lymphatic system the bacilli might gain entrance directly into the lymphatics of the stomach, or through the contiguity of an infected lymphatic gland; thus a tuberculous gland may become adherent to the wall of the stomach and ulcerate through. In our case there were three large caseous glands behind the ulcer, one of which was closely adherent to the floor of the ulcer and showed microscopic communication with it.

Infection through the blood stream is believed by Arloing to be the most usual method. To support this theory, he brings the fact that in his numerous experiments on animals he was but twice able to produce a tuberculous gastric ulcer, and in both of these cases the bacilli had been injected into the blood stream. In one there had also been an intraparietal injection. One of these artificially produced ulcers was situated in the duodenum, but to all intents and purposes a duodenal ulcer is practically the same as a gastric ulcer. The fact that tuberculous gastric ulcers are more common in acute miliary tuberculosis also strengthens this theory. Infection through the serous coat of the stomach is admitted as at least possible, although certainly very unusual.

We wish here to report a case of large single tuberculous ulcer of the cardiac end of the stomach without pulmonary involvement.

7. Albany Med. Ann., 1898, p. 594.

Patient.—M. J., aged 18, female, single, was admitted to the Garfield Memorial Hospital April 12, 1907.

Family History.—Negative.

Previous History.—Diseases of childhood; otherwise healthy.

Present Illness.—The patient has not been well for the past few months, but is unable to state exactly when illness began. Appetite has been poor. Has lost weight greatly. Was treated in Freedman's Hospital for three weeks about three months ago (does not remember exact date), and at that time she had persistent vomiting which occurred a few minutes after taking food or water and was not accompanied by nausea. There was diarrhea. Vomitus and dejecta sometimes contained blood (?). Now she complains of pain in throat, particularly on swallowing. There is vomiting and diarrhea, but not so severe as formerly. There is no cough but she raises considerable mucus from throat. She complains of a swelling in the upper part of the abdomen. Owing to the patient's low grade of mentality and weakened physical condition, the history was obtained with difficulty and is unsatisfactory.

Physical Examination.—Emaciation extreme. Slight exophthalmos. Tongue clean, smooth and red. Pulse small, regular and frequent. Heart normal. Lungs normal. There is a distinct protrusion in the epigastric region, the most prominent point of which is in the median line, one-third of the distance from the xiphoid to the umbilicus. The abdominal wall is extremely tense, especially over the above-mentioned area. There is marked tenderness on pressure over the tumor, which is smooth and conforms in its general outline to an enlarged liver (which it later proved to be). The lower border of the right lobe of the liver is found to be on a level with the umbilicus; the lower border of the left lobe about two inches higher. Liver dullness begins above the nipple line at the fifth interspace and extends downward to a horizontal line just above the umbilicus. The left lobe extends to a point about two inches higher. There is dullness over the lower portion of Traube's semilunar area. Posteriorly the liver dullness extends below its normal position. The spleen can not be distinctly outlined. There are no superficial glandular enlargements. Knee jerks are absent. The record of the pulse, respirations and temperature were of no value from a diagnostic point of view. There was vomiting and diarrhea with involuntary movements. The various examinations in the clinical laboratory threw but little light on the case. These were as follows:

SPUTUM: April 14.—Negative to tubercle bacilli.

VOMITUS: Very sour fluid with strong acid reaction. Contains milk curds and a large amount of mucous of a purulent character. Trace of lactic acid. Microscopic examination showed numerous leucocytes, no red cells, numerous large bacilli, sarcinæ and other organisms.

BLOOD: April 6.—

Hemoglobin	80 per cent.
Red cells	4,848,000
Leucocytes	15,200

April 15.—

Hemoglobin	70 per cent.
Red cells	4,920,000
Leucocytes	28,200

Differential leucocyte count, 500 cells:

Small lymphocytes	16.0
Large lymphocytes	2.8
Transitional	1.0
Polynuclear	80.0
Eosinophile	.2
	<hr/> 100.0

URINE: April 6.—Acid reaction. Specific gravity, 1015. Albumin, 7 per cent. Granular casts. Numerous leucocytes.
April 13.—Acid reaction. Specific gravity, 1007. Albumin, 5 per cent. Hyaline and granular casts. Numerous leucocytes.
April 17.—Acid reaction. Specific gravity, 1015. Albumin, 8 per cent. Granular casts. Numerous leucocytes.
FECES: April 15.—Light yellow fluid stool, with granular sediment. Offensive odor. Few epithelial cells and leucocytes. No red cells. Cercomanos intestinalis numerous.

Treatment and Result.—From the history and from the enlarged liver, malignant disease of the stomach, with probably a secondary involvement of the former organ, was suspected in spite of the patient's age (18 years). With the possibility of tuberculous peritonitis in view, Dr. A. A. Snyder opened the abdomen and discovered very minute miliary tubercles on the small intestine, though no active inflammatory condition existed. Death occurred shortly afterward. The extreme tenderness over the liver, especially in the epigastric region, already mentioned, must have been due to the large gastric ulcer disclosed at the autopsy, the details of which follow. Tuberculous ulcer of the stomach was not suspected, though the history suggested a possible ulcer.

AUTOPSY—MACROSCOPIC EXAMINATION.

General Appearance.—Small negro girl. Much emaciated. Bones small and symmetrical. Marked depression of supraclavicular and infraclavicular regions, not so marked in intercostal spaces. Breasts relatively well developed. No skin lesions.

Respiratory System.—Larynx normal. Lungs collapsed on opening thoracic cavity. They are of a pinkish-white color and mottled with anthracotic pigment, soft, crepitant and float in water. On section, moderately moist, reddish-pink color and pigmented. Bronchi contain pinkish frothy material. Neither lung shows any adhesions. The pleura is a light pink color and smooth throughout; no adhesions. Bronchial glands not enlarged and show no gross evidence of tuberculosis.

Circulatory System.—Heart small, weighing 145 grams. Normal position. Brownish-red color and flabby texture. Aortic and pulmonary valves normal. The tricuspid leaflets thickened and show areas of opacity. Anterior leaflet of mitral valve thickened, yellowish white and quite hard. All cavities contain dark clotted blood. Pericardium normal. No atheroma of aorta.

Lymph Glands.—The retroperitoneal glands were much enlarged, forming a fusiform tumor along the left of the spinal column for about six inches, the upper pole lying beneath the left lobe of the liver. These glands are conglomerate, soft, of a greenish-yellow color, and completely necrotic from cheesy degeneration. The centers of some of them have undergone liquefaction. The glands along the lesser curvature of the stomach, portal vein, behind the stomach, and around the head of the pancreas are also enlarged and similarly affected. The mesenteric glands are but slightly enlarged and are congested. Near the intestinal ulcer is one the size of a pea. Superficial glands are not enlarged.

Spleen.—Bright red color, dry, firm and greasy on section. Usual markings replaced by lobular like structure. Weight, 130 grams. Iodin reaction for amyloid.

Thyroid Gland.—Normal.

Liver.—Ten cm. below costal arch in midaxillary line; 12 cm. below ensiform. On left extends to junction of midclavicular line and ninth costal cartilage. Upper relations normal. Weight, 1,800 grams. Firm and slightly nodular to the touch. Reddish green color. On section, dry, firm and greasy. Iodin reaction for amyloid

positive. The nodules beneath the capsule are small, yellowish white and soft, and similar areas are seen deeper in the organ.

Pancreas.—Normal in size and situation. Head firmly bound down by adhesions with enlarged glands. On section head shows areas of cheesy degeneration. None found in tail.

Kidneys.—Normal position. Pale, firm and greasy. Weight of right, 140 grams; left, 160 grams.

Genital Organs.—Uterus small and retroflexed by adhesions. Right ovary prolapsed into cul-de-sac; left one firmly adherent. Organs normal.

ALIMENTARY TRACT.

Peritoneum.—Parietal layer pinkish-white, smooth, moist and glistening; 200 c.c. cloudy reddish fluid in cavity. Adhesions in region of cecum and pelvis. Omentum ample, contains normal amount of fat, bile-stained in region of gall bladder.

Intestines.—The small intestine is a pale pink color. From the pylorus to the cecum, beneath the serous coat, are numerous minute grayish-white, raised points, giving a granular appearance to the gut. About midway, within the lumen, is a circular ulcer 2 cm. wide. Ulcer is undermined with ragged edges, which show some thickening. An enlarged gland is present just without at the mesenteric attachment, but not communicating. Bowel is congested in region of ulcer. Large intestine collapsed and no lesions present either without or within.

Stomach.—Organ small and normally situated. No adhesions except at cardia and along lesser curvature. Dissection of this region shows three large caseous lymphatic glands, the largest 4 by 2 cm.; one situated close to the esophagus, one about the middle of the lesser curvature, and the other between these two. The gland in relation with the esophagus has no connection with the stomach wall, but the other two are intimately fused with what proves to be the base of a large ulcer on the inside of the stomach. The outer gland shows calcareous areas, and all are caseous. Several small congested glands are seen around the cardiac orifice, but these are not caseous as are the larger ones. On opening the stomach a large single ulcer is seen in the cardiac end, extending nearly around the esophageal opening and to the middle of the lesser curvature, its outer extent corresponding to the situation of the outer large lymphatic gland. It is covered with a yellowish-white mucoid material. The dimensions of the ulcer are: Length, 9 cm.; width, 4.5 cm. Its edges are irregular, undermined, much thickened, very firm and pale. The floor is cribriform and of varying thickness, measuring at one point 4 mm., at another 1 mm., and at one point only the serous coat is present. Tubercles are not evident in the floor. Dissection from without in, opposite the middle lymphatic gland, just beneath the superficial portion of the floor, shows a calcareous area 2 mm. in diameter, surrounded by a circular zone of pearly white tissue. The mucosa elsewhere shows no ulcers. The lymphatics on the serous coat in the vicinity of the caseous glands and elsewhere show no tubercles.

Esophagus.—Normal.

AUTOPSY—HISTOLOGICAL EXAMINATION.

Liver.—Extreme amyloid degeneration. Tubercles, with giant cells. Round cell proliferation in portal tracts and a high grade of fatty degeneration.

Pancreas.—Section from head shows caseation, but no giant cells. Areas of round cell proliferation in lobules.

Kidneys.—Extensive degeneration of epithelium of convoluted tubules. Marked amyloid degeneration, principally in the tufts. Areas of round cell proliferation throughout. Increase of connective tissue between tubules in pyramidal portion.

Spleen.—Practically all amyloid. Here and there are seen remains of Malpighian bodies with dilated and congested vessels. No tubercles seen.

Intestine.—Sections from ulcer and contiguous tissue show numerous tuberculous areas, varying in size. The centers of these are caseous, with outer zones of lymphoid and epithelioid cells. The most conspicuous condition is a hyperplasia of the connective tissue elements in the submucosa, with areas of adipose tissue and numerous dilated and congested vessels. Giant cells are present, but only occasionally seen. The vessel walls are thickened and show a hyaline degeneration. In places the muscular coat has been infiltrated, and in some places entirely replaced, by the tuberculous process, the latter extending to the peritoneal coat. The base of the ulcer shows superficial necrosis, beneath which is connective tissue, infiltrated with lymphoid and epithelioid cells. Edges of ulcer show chronic thickening. Mucosa of intestine elsewhere shows atrophy of epithelial elements.

Stomach.—Our studies here included examination of section from various portions of the ulcer and stomach wall. The base of the ulcer is for the most part composed of the outer longitudinal muscular coat, though in places there is only the thickened serosa. The gastric surface shows superficial necrosis. Beneath this zone of necrosis is a chronic hyperplasia of the connective tissue, with many lymphoid and epithelioid cells. In some places the muscular coat is entirely replaced by this process. The serous coat is much thickened and infiltrated with lymphoid cells, which are seen in longitudinal columns. Some of the vessels are completely organized and all show thickened walls with a hyaline degeneration. Direct communication can be traced to one of the lymphatic glands through the serous coat. The edges show atrophy, distortion and degeneration of the gland tubules, with a marked proliferation of the interglandular connective tissue. Near the esophagus are areas showing dense aggregations of lymphoid cells with necrotic centers. One of these extends to the surface. No giant cells are seen in any of the stomach sections examined. Tubercle bacilli in small numbers (usually in groups of two or three) are found in the edge of the ulcer. The organ in other portions, but for an atrophy of the mucosa, is normal.

Lungs.—Larger vessels congested and mild grade of capillary congestion. Anthracosis. Alveoli dilated in places, but contain no exudate, cells or debris.

Myocardium.—Normal.

Thyroid Gland.—Normal.

Lymph Glands.—Sections of various lymphatic glands show them to be uniformly necrotic, with occasionally a narrow rim of the gland tissue. No giant cells are seen in any of the glands.

ANATOMIC DIAGNOSIS.

Single tuberculous ulceration of the stomach and intestine; tuberculosis of the abdominal lymphatic glands, liver and pancreas. Amyloid degeneration of spleen, liver and kidneys. Tuberculous peritonitis, involving the visceral layer of the small intestine.

The point of greatest interest in our case is the healthy condition of the lungs, which is most unusual when there is tuberculous ulcer of the stomach. We have found but six similar instances, abstracts of which follow:

CASE 1.—Reported by Besnier.⁸ Man, 57 years old, sick three months, greatly emaciated, lower extremities edematous. Nothing found in thorax or abdomen to explain cachexia. The only symptoms: Diarrhea, loss of appetite and vomiting. Autopsy showed tuberculosis of the abdominal glands, with one large gland ad-

8. Bull. Soc. anat. de Paris, March, 1867, p. 97.

herent to the posterior wall of the stomach, this gland having suppurated and perforated into the organ.

CASE 2.—Reported by Paulicki.⁹ Man, 41 years old, presenting symptoms of anorexia, repeated bloody vomiting, finally death from peritonitis. Autopsy showed several ulcers near the pylorus, varying in size, the largest, one and one-half inches long, situated on the anterior surface of the stomach, had perforated. Tuberculosis of the glands along the lesser curvature and of the mesenteric glands. Ulcers in the intestines. Few miliary granulations in liver and kidneys. No tuberculosis of the lungs.

CASE 3.—Reported by Hattute.¹⁰ Man, 47 years old, complained of having vomited his food for about eight years. After each meal there was acute pain in the stomach. There would be distension and in from ten to twenty minutes, very rarely at the end of an hour, vomiting would occur. This happened even after small amounts of water were taken. There was marked tenderness over the epigastrium. No melenæ. Autopsy showed tuberculous peritonitis, marked pyloric obstruction due to a circular mass of granulations similar to those on the peritoneum. Mesenteric and bronchial glands tuberculous. Some pleural adhesions. Lungs healthy.

CASE 4.—Reported by Lava.¹¹ Man, 26 years old, history of gastric catarrh for three years. Epigastric pain, vomiting and diarrhea. Abdomen became tender to pressure. A painful mass felt in the right hypochondrium. The diagnosis of pyloric stenosis, with probably gastric ulcer was made. Symptoms of acute peritonitis developed and death occurred in twenty-four hours. Autopsy showed a circular ulcer found in the pyloric region which had perforated. Old adhesions between the stomach and intestines. Pyloric glands very large and caseous. Microscopic examination showed typical tubercular structure. No trace of tuberculous process in the lungs or in other organs.

This case was most remarkable in that there was no tuberculous process in other organs.

CASE 5.—Reported by Orlandi.¹² Man, 26 years old, suffered from the age of 14 to 17 with intestinal parasites. Some years later, dyspeptic symptoms developed, at first stomacic, later intestinal. These phenomena grew progressively worse, with rapid emaciation, finally ending in death. Autopsy showed an annular ulcer surrounding and obstructing the pylorus. Neighboring lymphatic glands were greatly enlarged and caseous. Histologic examination proved the ulcer to be tuberculous. There was no trace of tuberculosis of the lungs or of any other lymphatic glands. This was apparently a primary lesion of the stomach.

CASE 6.—Reported by Margarucci.¹³ Man, 65 years old, delicate from infancy, had malarial fever and syphilis. Some years earlier he began to vomit after eating, at first without pain. For six years he vomited five or six times a day, sometimes immediately after taking food, more often several hours after. He then had a respite of five months, during which time the digestion was simply labored. The trouble then reappeared and was variable for three years. Soon in addition to vomiting, severe epigastric pain was added, and the vomitus had the appearance of coffee grounds. The stomach became more and more irritable and emaciation rapidly ensued. He never had any cough or fever. There was constipation later, followed by diarrhea. The abdomen was retracted, and marked intestinal peristalsis was visible. Below the xyphoid, deep pressure caused pain

9. Berl. klin. Wehnschr., August, 1867, p. 349.

10. Gaz. d. Hôp., 1874, p. 859.

11. Gaz. med. di Torino, 1893, p. 915.

12. Gaz. med. di Torino, 1893, p. 33.

13. Policlinico, Rome, 1898, p. 75. Sezione Chirurgica.

Internal view of stomach showing ulcer. Organ opened on greater curvature.

External view of lesser curvature of stomach showing caseous glands.

and an ill-defined resistant surface could be felt moving slightly with respiration. Clinical tests indicated pyloric obstruction. Gastroenterostomy and enteroplasty were done, but death occurred two days later. Autopsy showed multiple stenoses of the intestine and stenosis of the pylorus, due to an ulcer which was histologically shown to be tuberculous. The lungs were free from tuberculosis.

The first four cases were cited by Arloing,³ the last two by Ricard and Chevrier.⁴

SUMMARY.

Our studies show a case of tuberculous infection of the digestive tract, as evidenced by the limitation of the process to the stomach, intestine, liver, pancreas and lymphatic structures draining these organs.

There existed a large single tuberculous ulcer of the stomach, with no involvement of other parts of the organ. This ulcer possessed the usual characteristics of a tuberculous lesion—ragged, thickened, undermined edges and cribriform floor. This was confirmed by histologic examination and the finding of tubercle bacilli in the tissue.

The connective tissue hyperplasia, absence of giant cells and paucity of bacilli in the tissue, speak for an attenuated infective process.

The route of infection seems to have been through the lymphatic system of the gastrointestinal tract. Pulmonary origin has been absolutely excluded by the absence of any tuberculous lesions in the lungs or bronchial glands. This fact was determined with great care, both macroscopically and microscopically.

As to whether the primary seat of infection was the ulcer in the stomach, from which the abdominal lymphatics became infected, or whether the lymphatic glands infected the gastric wall by contiguity, we are unable to say, but the latter seems the more probable.

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