principle is not to be strictly maintained. Occasionally in practice we meet with cases of stomach disturbance in which a diagnosis of either ulcer or cancer is suggested, and in which there is reason to believe from the character and duration of the symptoms that the latter condition, if present, may be so little advanced that the complete eradication of the disease may be accomplished by surgical procedure. In such cases it seems to me that immediate operation is justifiable. It is true that only in rare instances is it possible to eradicate cancer by operation. Cases of this kind do, however, occur and it is by following this line of procedure that we are likely to find them. The following case report illustrates this point:

History.—The patient, a man aged 50, came to me in 1904. He complained at the time of a dull pain in the epigastric region present much of the time, and slightly aggravated by ingestion of food, loss of appetite and frequent desire to raise gas from the stomach. There had been no vomiting or other symptoms. There was loss of weight. The duration of the symptoms was three months at the outside.

Examination.—Physical examination other than the examination of the gastric contents showed nothing abnormal. The hemoglobin was 85 per cent. Examination of the contents of the fasting stomach, obtained by tube 12 hours after the ingestion of food, gave the following findings: Quantity, 25 c.c.; character liquid, like the white of an egg, and colorless; no food remnants were present. The guaiac test for blood was positive. Contents gave no fermentation test with glucose. Lactic acid was absent. The contents obtained one hour after an Ewald test breakfast gave the following characteristics: Quantity, 100 c.c.; food fairly digested; free HCl present, quantity low, .007 per cent.; blood present by guaiac test.

A similar finding to that given above was obtained in the fasting contents on four separate examinations. In each instance a positive blood test was obtained. No fresh blood was seen. The feces showed blood by the guaiac test.

Operation.—The case was recommended for operation with a diagnosis of either ulcer or cancer. Operation was performed by Dr. Greenough, Oct. 14, 1904. At operation a small nodule with a slight ulceration on its surface was found in the antrum pylori. No enlarged glands were found. The nodule was excised and a pyloric resection performed.

Pathologic examination of the excised mass showed the presence of carcinoma.

The patient had a good immediate recovery and in the interval of 18 months since operation has been well. He has regained his normal weight and held it, works regularly, and has suffered from no dyspeptic symptoms. In this case the early operation was advised for the following reasons: The constant blood findings showed the probable presence of ulcer or cancer. The general picture of the symptoms was more suggestive of cancer than ulcer. The short duration of symptoms suggested that if cancer were present it might be so little advanced that the disease could be entirely eradicated by operation. Whether or not the disease has been entirely eradicated is, of course, still an open question. At all events the patient has enjoyed two years of perfect health as the result of our procedure.

ETIOLOGY AND DIAGNOSIS OF GASTRIC AND DUODENAL ULCER.*

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CHICAGO.

Acute gastric ulcer and the so-called abrasions of the mucous membrane of the stomach are identical in their morbid anatomy and pathology. As a rule these are superficial and extend wholly or through a part only of the mucosa. They are not uncommon and many occur in chronic circulatory disturbances due to heart and

arterial disease and to cirrhosis of the liver. They may be postoperative events, especially in abdominal section. They appear in cachectic states due to chronic diseases and are not infrequent in the new born. They may appear in certain neurotic conditions, especially in women.

These acute erosions are soft, sometimes blood stained, often multiple, frequently consist of mere slits in the mucous membrane, may be so small as to escape detection and usually would not exceed 4 mm. in diameter. The largest may be dignified by the name of an ulcer. These acute processes are important only when the erosion involves an artery or vein of considerable size, when a fatal hemorrhage may occur. These acute processes will not be further considered in this paper.

ETIOLOGY.

Chronic ulcer of the stomach and duodenum, frequently termed round, perforating or peptic ulcer, follows nutritional disturbance of a limited area of the mucosa, which results in the destruction of this circumscribed region by the gastric juice. The gastric juice is the destructive agent and, therefore, plays the most important rôle in the causation of ulcer of the stomach and duodenum.

The cause of the condition which permits the gastric juice to attack a part of the mucous surface of the stomach or duodenum is not altogether clear. Probably several conditions may be important factors. It is probable that in certain instances vascular disease in the form of thrombus or embolism, with or without antecedent disease of the wall of the vessel, may be a cause. It is equally true that this condition is not present in the majority of the individuals who suffer from ulcer.

Hyperacidity of the gastric contents, with or without stagnation, is a common accompaniment of ulcer, but it is probable that it is an accompaniment and not a cause of the disease. Chlorosis has been noted in ulcer of the stomach, especially in the young female, but many cases of ulcer occur without anemia and the anemia, when present, is very frequently the result of the loss of blood incident to the ulcer. Central or pneumogastric nerve disease has been ascribed as a predisposing cause, but the evidence is not conclusive. Local ischemia from muscular spasm, especially in the pyloric region, thus predisposing the circumscribed area to destruction by the gastric juice, has been ascribed to this nervous influence. Traumatism from external violence or local traumatism from the contact of rough particles of food on the mucous membrane, and especially in the pyloric region, has been ascribed as a cause. It is known that small traumata of the normal mucous membrane heal rapidly and trauma alone is, therefore, probably not a cause. Stasis of stomach contents with decomposition has been ascribed as a cause, and it doubtless is a factor, especially when associated with bacterial infection. Bacterial infection with invasion of the mucous membrane may so reduce the nutrition of the cells as to render them liable to digestion by the gastric juice. Recently Dr. Fenton B. Turck, Chicago, has been able to produce a typical chronic ulcer of the stomach by feeding dogs with colon cultures over a considerable period of time.

Self-digestion does not occur in a healthy stomach because of a resistance of the normal cells which has heretofore been called vital. It has been suggested that this resistance is, in reality, the presence in the cells of the stomach of an antibody. Under certain conditions this antibody may disappear or may be so disturbed that it no longer protects the mucous membrane in certain localities permitting the gastric juice to attack the tissues.

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To sum up our present knowledge of the cause of ulcer, it is that the gastric juice is the active agent in its production in a limited area and that this occurs because of a nutritional disturbance in a circumscribed region of the mucosa. That the nutritional disturbances may be brought about by bacterial infection associated with local trauma and that vascular disease, local areas of muscular spasm, gastric stagnation and anemia may all serve as factors in certain instances.

DIAGNOSIS.

In a classic case of ulcer there are three chief diagnostic signs. These are, in their order: pain which is usually felt in a localized area and is aggravated by a palpation and by food; second, hematemesis or melena; third, hyperchlorhydria and the some time evidences of gastric stagnation.

The pain of ulcer is characterized by the fact that it is usually felt in the localized area and that it frequently appears to the patient to pass through the body, to be felt in the back, usually on the left side near the spine at the eleventh or twelfth rib. The pain is often periodic, appearing for a day or days with severity and may be followed by an interval of less discomfort varying from days to weeks to months or even years. With the pain there is a localized tenderness which is very severe and is usually situated in the epigastrium. The pain is frequently aggravated by food. In certain instances this occurs immediately after food enters the stomach and in others not for one, two or even three hours after food is taken. The pain frequently continues until the stomach is evacuated by vomiting or until the food has passed through the pylorus. Not infrequently one obtains a history of attacks of acute exacerbations of pain extending over a period of years. These exacerbations are frequently attended with vomiting of food, with or without the appreciable appearance of blood. Frequently such patients are said to have dyspepsia, with the appearance periodically of neuralgia of the stomach.

Hematemesis and melena occur in fully one-half the cases of ulcer of the stomach. The vomited blood is usually dark in color, acid in reaction and is clotted. When passed by the bowel it is frequently tar-like in consistency and color. The occurrence of blood in vomited material and in the stool in an individual who has suffered from dyspeptic symptoms, and especially if he has had pain, is an important sign of ulcer. Occult blood may be detected in the stomach contents and in the stools from all patients who suffer from ulcer of the stomach. The appearance of occult blood usually is not constant, but will always be found if the tests are applied over a sufficiently long period of time. The Weber test for occult blood is a practical one and is reliable when safeguarded by the exclusion of the contamination of the stomach contents and of the stool, by blood from other sources, than the stomach and duodenum. The presence of iron taken as medicine and excreted in the stool will give a blue line resembling the blue line of the presence of blood when peroxid of hydrogen is used in the Weber test.

Hyperchlorhydria is present in the majority of ulcers of stomach and of the duodenum. In a small minority of patients with ulcer there may be a normal or subnormal amount of HCl or an entire absence of it in the stomach contents. In many conditions, especially neurotic in character, hyperchlorhydria exists without ulcer. Therefore, the occasional absence of hyperchlorhydria in ulcer, and the fact that it frequently occurs in neurotic conditions, makes it less reliable as a diagnos-

tic sign in ulcer. Hyperchlorhydria with evidences of pain as indicated above and with the presence of blood, either evident or occult, in the stomach contents and the stool, however, is a positive sign of ulcer. Hyperchlorhydria with gastric stagnation and especially if the fasting stomach shows the presence of a considerable amount of acid secretion, is also of importance in the diagnosis of ulcer.

Chronic ulcer is often latent, and, if latent, one or all of the signs given above may be absent. Frequent intervals of latency follow periods which present the above symptoms. A careful investigation of the history of the patient will frequently enable one to elicit a history of attacks of acute dyspepsia associated with pain followed by intervals of latency with little or no symptoms of indigestion. In the latent state an ulcer may be partially or completely healed and the subsequent acute attack be due to a recurrence of the ulceration or to the formation of a new ulcer. In the latent period a careful examination will show, as a rule, undue epigastric tenderness; will usually show hyperchlorhydria, and, if the ulcer be unhealed, occult blood in the stomach contents and stool. Not infrequently, too, the latent condition will be accompanied with the secretion of an usual amount of acid gastric juice within the fasting stomach.

Duodenal ulcer is not infrequently associated with gastric ulcer, and its etiology is probably the same. Ulcer occurs in the duodenum between the pylorus and the papilla of the bile duct. So situated, its position is so near the pylorus that it produces practically all of the symptoms of the gastric disease, with the exception that usually melena alone and no blood vomiting occurs.

Chronic ulcers of the stomach occupy, in the great majority of cases, the pyloric half of that organ and the largest number of them appear on the posterior wall. When near the pylorus, the saddle ulcers, so called, may occur, and in some instances they may cover a very large surface. When near the pylorus they cause tonic contraction of the stomach, involving the pyloric end of the stomach with resulting stenosis. Stagnation of stomach contents results with, at first, hypertrophy of the muscle of the stomach wall. Chronic ulcer involves the deeper structures of the stomach wall and may have at its base the submucosa, the muscle or the thickened peritoneum which frequently becomes adherent to some neighboring organ. The scar resulting from partial or complete healing of an ulcer, the infiltrated and thickened wall of the stomach or pylorus and the perigastric adhesions frequently produce disturbances of motility which result in symptoms of great importance in the diagnosis of ulcer. Given a history of dyspepsia with pain, tenderness, hematemesis or melena, or of occult blood in the stomach contents and stool, hyperchlorhydria with evidences of gastric stagnation, if after a full meal the stomach does not become practically empty in seven hours and if the stagnant element is hyperacid and if it contain undigested starch cells, ulcer of the stomach or of the duodenum near the pylorus is present.

DIFFERENTIAL DIAGNOSIS.

Cholecystitis, with or without gallstones, may simulate ulcer of the stomach. Such an attack is associated with more or less severe pain in the epigastrium which may radiate to the right shoulder. There is usually marked tenderness in the region of the gall bladder, which, when pressed on, causes a pain which usually radiates to the epigastrium. Hyperchlorhydria may be present, but in uncomplicated cases blood is absent from the stomach contents and from the stool. With adhesions between

the gall bladder, the liver and the pylorus, motor disturbances of the stomach may be present. In the interval between the attack of cholecystitis there may be some tenderness in the gall-bladder region and especially if sharp percussion be made over a limited area. This tenderness is more characteristically elicited if the stomach is first distended with gas. When cholecystitis is associated with jaundice and evidences of general infection manifested by chill and febrile disturbance, the diagnosis is more plain.

In pyloric stenosis from simple hypertrophy, there is not the severe pain of ulcer nor is there usually the frequent hyperchlorhydria of ulcer. Simple hypertrophy occurs most frequently in the new born. The differentiation of pyloric stenosis from simple hypertrophy can be made usually from the history, which will elicit the fact that the patient suffered at some time in his life with the characteristic symptoms of ulcer.

Cancer of the stomach, especially of the pylorus, may present difficulties in diagnosis, for the reason that not infrequently cancer is engrafted on an ulcer base. When this occurs the history of the patient will frequently be characterized by the symptoms of ulcer with usually a latent period preceding the development of the neoplasm. In such cases there may be the pain, the tenderness and the hyperchlorhydria of an ulcer and usually the presence of a palpable tumor. As ulcer of the stomach may cause infiltration of the stomach wall and of the pylorus to a degree which will afford a palpable tumor, the diagnosis would necessarily be in doubt in such cases. In cases of sufficiently long standing, metastatic growths in the liver and in the palpable lymph glands, especially those above the clavicle, the cachexia, the anemia and the presence of decomposing stomach contents, containing lactic and other organic acids and the Oppler-Boas bacillus, would enable one to differentiate the disease from ulcer.

NEUROSES OF THE STOMACH.

Neuroses of the stomach are very common in everyday practice. They may be associated with sensory, secretory and motor disturbances. There may be severe pain and burning, hyperchlorhydria, vomiting or spasm of cardia or of the pylorus. In uncomplicated cases, blood, both apparent and occult, would be absent from the stomach contents and feces, but the other conditions named may be so severe that it will require a study of a considerable period of time to enable one to say that ulcer is not present.

Attacks of gastric crisis in the course of locomotor ataxia have been mistaken for ulcer of the stomach. There should be no difficulty in recognizing the fundamental cord disease if a careful examination is made.

The referred pain of appendicitis may appear in the epigastrium with the association of nausea, vomiting, etc. It may be mistaken for perforating ulcer, but should never be mistaken for uncomplicated ulcer.

The Dietl phenomenon occurring with floating kidney is associated with epigastric pain, nausea, vomiting, etc. It should not confuse the observant clinician.

The abdominal and sometimes epigastric pain of pneumonia and of pleuritis will not be mistaken for ulcer by one who examines his patients.

Ulcer of the stomach and duodenum is not an uncommon disease. When the classic symptoms are present, the diagnosis can be easily made. When the disease is latent and when it is masked by conditions, the result of a neurotic temperament, the diagnosis may be difficult. Sufficiently long study of the patient and of his his-

tory, of the chemical constituents of the stomach contents, of the motility and, finally, the test for occult blood in the stomach contents and in the stool, will enable one to arrive at a definite diagnosis in most individuals.

GASTRIC AND DUODENAL ULCERS.

WHEN DO THEY REQUIRE SURGICAL TREATMENT AND WHAT PROCEDURES ARE NECESSARY?*

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PHILADELPHIA.

We may say that surgical opinion has crystallized on some phases of ulcer, is crystallizing upon others and in some phases is still chaotic. The treatment of such complications as perforation and subphrenic abscess admits of no discussion whatsoever and may definitely be put to one side. Both must be met by prompt operative procedure, and it is not a question of whether to operate, but how. So far as hemorrhage is concerned there is honest room for doubt, and the variety of ulcer, its acuteness or chronicity, the amount of the hemorrhage, its recurring nature and the size of the vessel involved must be considered before a conclusion can finally and rightly be made. There is a greater difference of opinion between internists and surgeons as to the treatment of non-perforating, non-hemorrhagic ulcers with disabling adhesions and other gastric disturbances, purely mechanical in nature, following in their wake.

PERFORATION.

It is not to be questioned that spontaneous recovery may take place in perforation of either a gastric or duodenal ulcer, but in admitting the possibility of such an occurrence we should not, by accentuating it, make it appear even remotely probable.

Perforation is best considered by subdividing it into acute, subacute and chronic.

By acute perforation is understood a sudden communication between the stomach and peritoneal cavity, when the stomach is full of fluid and solid contents; extravasation necessarily occurs and the effects are usually instantaneous and overwhelming. By subacute perforation is understood a more insidious process, or, if as sudden, occurring when the stomach is empty. In either event extravasation into the peritoneal cavity will not occur, or if it does, to a most limited extent. Here a neighboring piece of omentum or coil of intestine may instantly cover the small opening made and effectually prevent extravasation. By chronic perforation a much slower and more stealthy process is understood. Here the plastic exudate limits the extravasation and a subphrenic abscess results. It should be treated by drainage, employing the abdominal, lumbar, or transpleural route, according to the preference of the surgeon and the exigencies of the case. A majority favor the abdominal route, some the combined abdominal and lumbar, while Körte, who has had a vast experience with subphrenic abscesses, prefers the transpleural route.

I have seen three unquestionable cases of subacute perforation resulting in spontaneous recovery. Two were confirmed by exploration when gastroenterostomies were subsequently done. I am of opinion that perforations acute and subacute are far more common than

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