2 gr., solution of strychnine 5 minims, with, in addition if there be pain, solution of morphine 10 minims. Bismuth salicylate is another valuable preparation which contains within itself antiseptic and alkaline properties and may be given in doses from 10 to 15 gr. When the acidity, despite this bismuth mixture, gains the upper hand, temporary relief will always be obtained by sipping a wine-glassful of very hot water in which 20 or 40 gr. of sodium bicarbonate have been dissolved. If the diet consists largely of farinaceous substances, 2 or 3 oz. of malt infusion, prepared according to Sir William Roberts's formula, should be taken with each meal. Whenever there is an excess of hydrochloric acid in the stomach the diastatic action of the saliva is prematurely arrested, and by means of malt given in this way we endeavour to assist Nature to dispose of the starchy portion of the food, which is apt otherwise to pass through the system undigested.

As in the case of atonic dyspepsia, when the urgent symptoms are relieved suitable tonics, still in combination with an antiseptic, should be ordered. It is often of advantage, after the hyperacidity is overcome and before resorting to blood or nerve tonics, to administer one or other of the mineral acids combined as for atonic cases but given *before* food.

Nervous Dyspepsia.—It is desirable in all cases belonging to this variety of dyspepsia to increase the quantity and variety of food as rapidly as possible, and it is especially necessary to get the patient to take as much fat in a digestible form as he is able to assimilate. The stomach discomfort depends upon nerve exhaustion, and is only a local manifestation of a constitutional state, which will not benefit from the routine plan of treatment by acids or alkalies. In this, however, as in other forms of indigestion, fermentative processes play a considerable part in the causation of the patient's discomfort, and again therefore antiseptics ought to be administered as part of the medication. The drugs which I have found to be most reliable for affording relief are zinc valerianate and arsenic. The powerful taste of the valerian is best concealed by administration in capsule form, and may be ordered according to this formula: Zinc valerianate, 3 gr.; pure carbolic acid, 2 gr.; arsenious acid $\frac{1}{10}$ gr.; extract of cannabis indica $\frac{1}{2}$ gr. One capsule should be taken after food three times a day. When sleep is much broken at night, and especially if gastric attacks are the disturbing cause, relief will be afforded by 30 gr. of sodium bromide, with 15 gr. of antipyrin taken on going to bed. Rest from mental and physical work is imperative, and there is no form of dyspepsia which benefits so much from change of surroundings, a stimulating and sunny climate, cheerful society, massage, and hydrotherapy.

ON FOUR CASES OF PERFORATING GASTRIC ULCER, OF WHICH THREE RECOVERED.*

By ROBERT JONES, F.R.C.S.E.,

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THE following are the details of the cases:

CASE I.—My first case was a shop girl of 19, who had been accustomed to long hours and hurried meals. She was well developed and not anaemic. She was of a strong tuberculous diathesis, having been treated when a child for a tuberculous elbow and for tuberculous dactylitis. For the last seven years, however, with an occasional exception, she had been in the best of health. Until a fortnight previously to her present illness, apart from a very occasional dyspepsia generally traced to some dietetic indiscretion, she had exhibited no signs of ulcer. She admitted to having been treated for palpitation two years before and that she had been ordered to take iron pills.

A fortnight before I saw her she had returned from her summer holiday, and after an attack of sea sickness had complained of pain after every meal. From its severity, the ease with which it could be localized, and the tenderness on pressure, the doctor diagnosed a gastric ulcer, and gave full instructions as to diet. A few days later the urgent symptoms arose, and Dr. Bennett hurriedly attended. He found the girl in very great pain, extremely tender over the abdomen, with rapid pulse and drawn face. I was sent for, and in less than three hours after the onset of acute symptoms the operation was begun. A median incision was employed, and the stomach explored, when a small opening was found about large enough to admit a crow-quill. Through this some food had travelled, consisting of partially digested milk. There were no adhesions

and barely any signs of even local peritonitis: a little lymph surrounded the orifice, which could be removed with the finger. The edges of the ulcer were not indurated. There had been some escape of gas into the abdomen. The ulcer was situated on the anterior surface of the stomach, a little below the lesser curvature, and quite at the pyloric end. There was nothing, therefore, to prevent its rapid inversion; and having roughened the parts around, a row of Lembert sutures completed the occlusion. The abdomen was irrigated and the wound was closed without drainage. The patient vomited twice during the night, and complained of great pain over the abdomen, and the temperature the following day was 101° and the pulse 115. Two days after the operation there was no pain, the tongue was moist, the pulse 96, the temperature normal, and the patient evinced but little desire for food or water.

On the third day she was fed on small quantities of peptonized milk, which gave her no inconvenience. In three weeks after the operation she was sitting up, and in seven weeks, having taken fourteen days' holiday, she resumed her work. Nearly three years have passed since the operation, and I have every reason to believe she is still well. The operation lasted less than twenty minutes, and every circumstance favoured her recovery. The small size of the perforation, the absence of induration, the condition of the surrounding peritoneum, the site of the ulcer, the small quantity and character of the escaped contents, and the fact that only three hours had elapsed since the rupture, all rendered the prognosis good and the operation easy. From a study of the girl's history and the appearance of the ulcer the possibility of a tuberculous origin is worthy of note.

CASE II.—The second case was sent to me at the Royal Southern Hospital on November 12th, 1898, by Dr. Humphreys, who had diagnosed a perforation. The patient was a woman, aged 21. Thirteen hours previously to admission she had been seized with violent abdominal pain and vomiting. I was in the hospital when she was admitted at 3 o'clock. She looked very distressed and complained of great thirst, and suffered intense abdominal pain. The pulse was 120, very weak, but not running in character. Her extremities were cold and the abdominal muscles very rigid. A rub could be heard accompanying respiratory movements over left lower ribs in front.

We decided to operate at once, and I wish to acknowledge the help of my colleague, Dr. Alexander. On opening the abdominal cavity, the surface of the colon and stomach was seen to be coated with lymph and to have become adherent to the lower surface of the liver. Adhesions had also formed between the stomach and the abdominal wall. These adhesions were carefully separated, revealing behind a cavity from which oozed brown fluid containing partially digested food. The opening from which this came was found high up beneath the liver, on the anterior surface, nearer the cardiac than the pyloric end. There was considerable difficulty experienced in bringing the ulcer sufficiently to the surface to enable us to stitch. The perforation would about admit a small finger. It was indurated and surrounded by lymph which was firm and adherent, and was carefully removed by a Volkmann spoon. We then proceeded to introduce sutures, but found they immediately tore through. A silk suture was therefore passed as near the anterior surface of the stomach as we felt to be safe, and made to surround the gastric opening. This was tightened in purse-string fashion and leakage prevented. The wall of the stomach was further brought over it and fixed by a row of Lembert sutures, while this was further fortified by sewing omentum over the region of the ulcer. The operation area was carefully irrigated with saline solution, and a gauze drain inserted. She patient seemed to bear the operation without material increase of shock, and saline injections per rectum were given for the dual purpose of restoring vitality and allaying thirst. On the next and succeeding days she was starved, with the exception of a drachm of water every hour and enemata of brandy, peptonized meat and milk.

On admission her temperature was 100°, and for the first four days it did not rise. Towards the end of the fifth day it fluctuated, its highest point being 101°. From this time to the fourteenth day it often reached 102°, but the patient in all respects, save a rapid pulse, seemed fairly well. On the eighth day the drain, which had become adherent, was removed. My house-surgeon, Dr. Owen, to whom I am indebted, noted on the fourteenth day: "Patient after the operation progressed favourably up to last night, although throughout the fourteen days the breathing was a little rapid. She was, however, able to take bread and a fair amount of beef-tea, milk, etc., and had not vomited since the operation, and the temperature for the last week had reached 101° in the evening. She had no rigors."

At 3 a.m., fourteen days after operation, she suddenly developed a ticklish cough, and soon expectorated a quantity of foul-smelling pus. Her breathing became rapid, and at 6 a.m. she looked cyanosed. I was away from home, but Dr. Alexander was fortunately at hand, and at 10 o'clock the patient was anaesthetised and the old sinus explored. There was no collection of pus found. An exploring needle was put into the thorax, but only clear fluid withdrawn. The needle was next passed into the left hypochondrium and pus withdrawn; this was followed by a free incision, giving exit to a quantity of fetid pus. The cavity was well washed out. The patient was throughout the proceedings very collapsed, and various restoratives were prescribed, including strychnine, digitalin, saline solution into axilla, brandy enemata, and (sinapism to precordium. At noon she had sufficiently rallied to inspire hope. In the evening she died.

A necropsy was made by Dr. Owen and Dr. Humphreys. They report that the sinus which was left at the top of the original laparotomy wound did not lead to any collection of pus. The upper surface of the liver was adherent to the lower surface of the diaphragm by very firm adhesions. The repair of the stomach performed fourteen days before was seen to be complete and the occlusion healed. The abscess cavity, which was opened the day of the patient's death, was seen to lead towards the posterior part of the under surface of the diaphragm. On separating the left lung from the diaphragm, to which it was firmly fixed, a small hole was found entering lung tissue and perforating diaphragm, and discharging foul-smelling pus. A probe passed through this perforation entered the abscess cavity, explored the previous day by my colleague. On slitting up the walls of this cavity it was seen to be bounded by the under surface of the diaphragm above and externally;

* Presented to the Section of Surgery at the Annual Meeting of the British Medical Association, held at Manchester, July-August, 1902.

by the colon, stomach, and thickened neighbouring tissues below; its posterior part was the opening communicating with the left lung. The spleen was contained in the centre of this abscess cavity. On opening the chest some clear serum and lymph were found in the left pleural cavity, and several pleuritic adhesions were apparent. On distending the stomach no fluid escaped. The wound in the viscus had quite healed, but four of the silk sutures were *in situ*; the others had disappeared. On the mucous surface a small depression showed where the ulcer had existed. There was no ulcer on the posterior surface.

CASE III.—My third case I saw late at night in consultation with Dr. Fisher, of Shell Road. The patient, a clerk, with a dyspeptic history, was dining in a café when he was seized with excruciating pain, and fell on the floor writhing in agony. He vomited soon after the onset. A medical man saw him, prescribed morphine, and sent him home, where he remained for some hours until Dr. Fisher was called. He stated that his stomach had troubled him for two years, chiefly by way of pain of a burning kind. On one occasion there had been hæmatemesis. Pressure over the stomach always gave him discomfort. Pain generally came on before food, and was usually eased when food was taken. Five or six weeks ago the pain was more constant and more severe, and was localized to the epigastric region. He was fragile, emaciated, and anaemic.

I saw him twelve hours after the onset, and found him lying in bed, having several times vomited. His face was drawn, his pulse 110 and very compressible. There was only a suggestion of distension. The liver dullness was notably diminished, and slight rigidity of the abdomen, absence of abdominal respiration, and marked shock. The history and symptoms pointed to perforation, and two hours later (or fourteen after the onset) we operated upon him in the hospital.

The anterior aspect of the stomach was explored, when an opening was found about 3 in. from the pylorus near the lesser curvature. Some undigested matter had escaped into the abdomen, and some was noticed issuing from the orifice. Around the opening, which was with difficulty brought to the surface, a considerable lymph exudate was noted, which was carefully removed before dealing with the ulcer. The edges of the ulcer were freshened, inverted, and occluded by a double row of Lembert sutures, and some omentum was stitched over the omentum line. Care was taken not to douche the abdomen, and the stomach exudate was merely mopped up by dry aseptic dabs.

The operation, which lasted half an hour, left the patient very collapsed, and we had recourse to hot cloths and strychnine. The patient made an uneventful but slow recovery, now and again vomiting, and once riding himself of a lemon pip.

The treatment consisted of saline cloths to relieve thirst, alcoholic nutrient enemata, morphine under the skin, and every four hours a teaspoonful of iced water. Feeding by the stomach was very cautiously begun on the fourth day. The patient at this date, eighteen months after the operation, is very fit, having become stout and strong, with barely any dyspeptic trouble.

CASE IV.—My last case, a woman of 30 had been an inmate of the hospital under the care of my colleague, Dr. William Williams. She had been treated for gastric ulcer, and had so far improved that she was allowed to go out. Some weeks later she experienced a sudden pain in the abdomen, accompanied by a faintness and retching but no vomiting. In seven or eight hours she reached the hospital, and an hour later she was on the operating table. Her abdomen was tense and rigid, her liver dullness increased, her breathing thoracic, and she was suffering from slight collapse. On examining the stomach a clean punched-out opening was noted on the anterior aspect from which issued a thick milky fluid. The opening was grasped by two forceps and drawn up into the wound; this prevented the escape of fluid. A purse-string suture was introduced around the opening nearly $\frac{1}{2}$ in. from the edges, and with the two forceps to the outside of the suture ring the stomach was held, while the forceps holding the edges of the wound were depressed and the edges inverted. The circular suture was now made tense, and the operation completed by a row of continuous Lembert sutures. No water was introduced into the abdominal cavity, which was hurriedly cleansed by aseptic dry dabs. The patient made an uninterrupted recovery with the exception of a non-suppurative parotiditis, and is now, eight months after operation, working, fat and well.

REMARKS.

The first case was as simple as the second was complex. A freely movable ulcer, localized extravasation, and immediate operation were enough to ensure success. My second case was under chloroform for fifty minutes in consequence of adhesions which had to be separated and the involvement of the cardiac end, the fixation of which rendered suturing a matter of considerable difficulty. Both my last cases are very encouraging, the third inasmuch as operation was not performed for fourteen hours after rupture. Although leakage had occurred in the last case the stomach contents did not appear to be of a very irritating kind.

It is of interest to note that over 95 per cent. of cases operated upon die, while life is rarely prolonged over thirty hours. While ulcers are more frequent on the posterior surface of the stomach perforations are much more frequently met with on the anterior aspect by the operating surgeon. This is probably due to the greater facility with which buttressing adhesions form behind. Jacobson states that out of 90 cases operated upon the perforation in 86 was on the anterior surface.

What is the cause of a subphrenic abscess not obviously connected with the wound area? With an ulcer on the posterior aspect it is easily explained, but it is noteworthy that many cases occur where with an anterior perforation abscess

at the back of the stomach is found. This may be accounted for in one of two ways: (a) By direct trickling of septic material through the foramen of Winslow, or (b) by lymphatic absorption. In an ulcer on the anterior surface the gastric contents have but to travel round the right free border of the lesser omentum and both the peritoneal cavities are soiled, and if the foramen of Winslow be closed by adhesions the invasion of an abscess in the lesser cavity will be obstructed. With regard to operative technique, I think it is well in all cases to scrape the surfaces and edges of the ulcer, and when practicable to use a purse-string suture as a preliminary measure. This can be done in a few seconds, and all extravasation stopped while the final occlusion is completed. I am also convinced that the use of dry dabs should supersede irrigation which serves to dilute, disseminate, and make more soluble the toxic contents. As Turner has suggested, one can easily infect the lesser peritoneal cavity by irrigation of the greater.

Mr. Tobin of Dublin raises a very interesting question when he pleads that no case of perforated gastric ulcer should be removed from where the lesion has occurred. To any one who has noted the effect of movement on the escape of the stomach contents the plea has much to recommend it, and if the diagnosis be correct the simplest appliances only are needed. Boiled towels, cocaine, a few forceps, domestic needles and thread, are all the real requirements in the average case. Many a life has been lost in transit from home to hospital.

OPERATIONS FOR GASTRIC ULCER, ACUTE AND CHRONIC.*

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THE title of this communication, adopted for the sake of brevity, is perhaps wanting in clearness. What I really mean is "operations in the acute emergency of perforation, and for chronic gastric ulcer, under other circumstances." The cases concerned are usually affected with chronic gastric ulcer, and the occurrence of acute perforation imports into them an element of hazard and danger that demands the greatest promptitude, both of recognition and action. It is not my intention to go into detail as to the symptoms of "acute perforation," because Mr. Robert Jones does so in his paper in this issue, and I dare say my cases of the kind are very much like his, both in nature and result, and it will amply suffice for my purpose to merely enumerate them.

TABLE I.—*Chronic Ulceration with Sudden Perforation.*

No.	Date.	Name and Sex.	Operation.	Remarks.
1	Sept. 11th, 1899	E. F. (F.), 31	3 days after perforation	Died 13½ hours after operation.
2	Jan. 19th, 1900	M. D. (F.), 24	5 hours after perforation	Alive and well, June 6th, 1902.
3	Nov. 27th, 1900	A. S. (F.), 23	2 hours after perforation	Alive and well, June 16th, 1902.
4	June 10th, 1901	R. M. (M), 45	14 hours after perforation	Alive and well, Nov., 1902.
5	Jan. 3rd, 1902	A. L. (F.), 28	3 hours after perforation	Alive and well, Nov. 1902.

1. My first case, in a woman aged 31, September 11th, 1899, was only recognized three days after the accident, and consequently the operation was done too late. Even here all the visible and accessible extravasation into the peritoneum was successfully dealt with. The patient died thirteen and a-half hours after operation.

2. My second case, in a woman aged 24, January 19th, 1900, was operated on five hours after the accident, and recovered in a fortnight without difficulty or drawback. I met her about June 6th, 1902, looking better than I had seen her. The emergency was recognized by my colleague, Mr. M. Thelwall Thomas, who was called to her at the time, and sent her

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