I do not claim that the treatment is specific on the ground that I have never lost a case, for it may be said that the number (about 40) is too small, or that they have been of a mild type, or that medical skill is favoured by the splendid climate of Newquay, or some other of the considerations which detract from the value of mere figures. I do, however, maintain that the practitioner will find that he has more control of the disease than can be obtained by any other form of treatment. The patient may be treated regularly, and the temperature will gradually fall, the pulse become slow, and the stools become normal. On the other hand, treatment may be stopped too soon, and the usual symptoms will recur. I was led to adopt the treatment by the following considerations:

I made and witnessed several necropsies on typhoid patients at a large London hospital, and was struck by the undigested condition of the food found in the stomach and intestines. I have removed from a stomach a mass as large as, and resembling, a Spanish onion, which consisted of laminated curdled milk. In no case did the food found in the stomach or intestines appear to be digested. Both macroscopically and microscopically the food was much as it was before it was swallowed, except that the milk was curdled and the contents of the ileum were very offensive; the colon was usually empty; the whole gastro-intestinal tract was in a congested condition, which steadily increased as the ulcerated portion was neared; the stomach was usually quite dry, and sometimes felt harsh. The cause of death in many cases seemed to be starvation, and I think it reasonable to suppose that Eberth's bacillus has the property of checking the power of digestion, either by raising the temperature of the body, or, possibly, in some more direct way. We know that the excretion of nitrogen through the kidneys, and of carbon through the lungs, is increased in fever; so, if food is not digested, the rapid wasting of typhoid patients is easily understood. The stools of severe cases in the wards were pultaceous, and consisted entirely of undigested food and mucus. Flakes of curdled milk, bearing no evidence of digestion, could often be seen with the naked eye.

In spite of the rarity with which Eberth's bacillus is found in the blood, we are now, probably, all of opinion that the multiplication of the bacillus takes place elsewhere than in the lumen of the gut, and that the ulcerations in Peyer's patches are merely the seat of election by which the bacillus endeavours to escape from its host. I may remind you that Vidal's reaction has been obtained on the fifth, and even the fourth, day of the illness, and that the bacillus has been found in the urine on the third day; while it has not been found in the stools until the ninth day. It is also found in the mesenteric glands and the spleen (9 out of 15 cases, Roux and Meisels), and has been found in the cerebral meninges (Férult); in the fetus; in the pus of abscesses; and in the sputum of typhoid patients when pneumonia intervenes (Chantemesse).

These observations seem to show that the blood stream has at least the power of disseminating the specific bacilli, and demonstrate the futility of endeavouring to combat the disease by means of intestinal antiseptics.

One is thus confronted with the salient points: (1) That the patient wastes because the food assimilated does not equal the elimination of urea and carbon dioxide; (2) the non-assimilation of food is in some way due to Eberth's bacillus; (3) the bacillus being safe from our direct attack by drugs, there remains nothing but to strengthen the resisting powers of the patient.

I have, therefore, given a mixture intended to enable my patient to digest the nourishment given, of which the following formula may represent the average for an adult patient:

R. Essen. Pepsintiae (Armour) $\mathfrak{z}\frac{1}{2}$ to $\mathfrak{z}\mathfrak{j}$, acidi nitro-hydrochlorici dil. $\mathfrak{m}\mathfrak{x}$, glycerini $\mathfrak{m}\mathfrak{x}\mathfrak{x}$, aquam ad $\mathfrak{z}\frac{1}{2}$.

The half-ounce I direct to be placed in half-a-tumbler, or more, of water, and to be sipped or taken as desired to relieve thirst. At first I give such a dose every hour, adding ten minims of spirit of chloroform if the heart seems to require stimulation beyond the powers of the pepsin. A few minims of liquor morphinae hydrochloratis may be added if pain or want of sleep at night make it seem desirable. As the temperature falls, which it usually begins to do on the second or third day of the treatment, I gradually lessen the frequency

of the dose. The mixture is, however, given throughout the illness until pain in the iliac fossa disappears, and temperature and stools become normal. I have never seen any unpleasant effects from its continuance, but have often regretted giving it up too soon. I may add that treatment is often begun by 1 gr. of calomel in powder, with 10 gr. of phenacetin, as an excipient. This may seem inconsistent with what I have said about intestinal antiseptics, but it is given on the supposition that non-pathogenic bacilli (such as the bacillus coli communis) may acquire pathogenic powers when fever alters their usual conditions of life. It appears likely that many of the complications of typhoid fever are due to "mixed infections" or to stimulation of micro-organisms which are usually inoffensive. At any rate, these powders lessen the offensiveness of the stools, and that must be an advantage.

Of course, none of the advantages of careful nursing are neglected. The patient is sponged frequently, fresh air insisted on, the feet kept warm, etc., and the better the patient is nursed the sooner he will recover. The diet consists, as far as possible, of milk (unboiled, but from a carefully selected dairy). I vary the flavour as much as possible by adding tea or coffee, the latter (without chicory) being, I think, the best cardiac stimulant we have, and useful in relieving the mental depression and headache. It is better not to give nourishment too often, but the frequency must depend on the amount which can be taken at a time. I prefer to give 5 or 6 ounces every two hours rather than half the amount every hour. Occasional meals of some form of beef-tea should be given to prevent the patient being too tired of milk. Very soon bread and milk, egg and milk, arrowroot, milk puddings, and scrambled eggs may be given, but a daily inspection of the stools can alone decide a change of diet. Diarrhoea does not cause trouble with this treatment, and to relieve constipation nothing answers better than small glycerine enemata.

I have been asked whether I consider the pepsin or the nitro-hydrochloric acid the more important drug. I do not know. Neither seems so useful in the absence of the other, and the glycerine seems to have more use than as a mere sweetening agent, and should not be replaced by a syrup. The special preparation of pepsin is probably not of importance; I have merely named the one I always use as an example of the dose to be given.

FIVE CASES OF PERFORATED GASTRIC ULCER TREATED BY ABDOMINAL SECTION AND SUTURE,

WITH REMARKS ON THE TREATMENT AND PROGNOSIS OF
THESE CASES.*

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I WILL first of all relate the course of five cases of perforated gastric ulcer which have recently come under my care, and will then make some general remarks on the prospects of surgical interference in such cases.

CASES.

CASE 1. *Leakage from a Perforated Gastric Ulcer: Formation of a Perigastric Abscess: Abdominal Section and Drainage: Recovery.*—F. B., a married man, aged 38, was admitted on May 12th, 1900, with symptoms of peritonitis of the upper half of the abdomen.

History.—He enjoyed good health until two years before admission. Since then he had suffered from typical symptoms of gastric ulcer with occasional hæmatemesis. Three weeks previously he was suddenly seized with violent epigastric pain, coming on ten minutes after food. He vomited once, became extremely collapsed, and for some hours was apparently moribund. Since then he has been confined to bed. He has had almost constant sickness, acute abdominal pain, and gradually increasing abdominal distension, with a hectic temperature.

Condition on Admission.—He was extremely emaciated. Temperature 102° , pulse 128. The abdomen was almost motionless on respiration. There was distinct fullness in the epigastrium and left hypochondrium. The swelling was tympanitic in front and dull in the loin. The lower intercostal spaces on the left side bulged, and there were no pulmonary sounds to be heard below the eighth rib. The heart was pushed upwards, and the apex beat was in the fourth intercostal space. There were loud pleural friction sounds to be heard on the left side. A diagnosis of a left-sided subdiaphragmatic abscess was made, due to a leak from a gastric ulcer.

* Read before a meeting of the Staffordshire Branch of the British Medical Association.

Operation.—Abdominal section was performed in the left linea semilunaris. On opening the abdomen a large subdiaphragmatic abscess was entered containing gas and pus mixed with stomach contents. The abscess was bounded by the diaphragm above, the falciform ligament of the liver to the right, the spleen to the left, and the anterior wall of the stomach and intestines below. It was irrigated and freely drained.

After-History.—He made a slow, gradual recovery. The contents of the abscess cavity remained peculiarly offensive for some days, and were always highly acid in reaction. Food was administered entirely per rectum for the first four days, and was then given in small quantities by mouth. He gradually put on flesh, and was discharged with a small sinus six weeks after admission. On October 21st, 1900, he was again seized with vomiting, and a swelling appeared in the region of the cicatrix. He was again admitted to hospital. A subdiaphragmatic abscess was opened in the site of the old abscess. The pus was very foul. Cultivations taken from it gave a pure culture of the streptococcus pyogenes aureus. He again made a slow recovery, and has since then remained in good health. He has, however, to exercise great care in his diet, and solid food occasionally produces epigastric pain.

CASE II. Perforation of an Old Gastric Ulcer on the Anterior Surface of the Stomach: Laparotomy and Suture thirty-seven hours afterwards: Death on twentieth day from Right-sided Empyema and Liver Abscess.—M. K., a housewife, aged 26, was admitted to hospital on January 28th, 1901. Two days before admission she was suddenly seized after a meal with acute epigastric pains and collapse. She felt sick, but did not actually vomit, and has not done so up till admission. Since the onset of the attack she has had no food by the mouth.

Previous History.—Severe dyspepsia for four years. Occasional vomiting after food. No history of haematemesis. Epigastric pain and tenderness always a marked symptom. Much loss of flesh lately.

Condition on Admission.—Abdominal facies marked. Temperature 102.6° ; pulse 120. Marked general peritonitis, with enormous tympanitic distension of the abdomen. Liver dullness absent.

Operation.—Abdominal section performed on the evening of admission, thirty-seven hours after the perforation. Large quantities of free gas and fluid found in the abdominal cavity. The anterior surface of the stomach and liver was covered with thick flakes of lymph. On removing these a perforation the size of a threepenny piece was seen on the anterior surface of the stomach in its cardiac third, and nearer the lesser curvature than the greater. The perforation lay under the costal arch on the left side, and to expose it it was necessary to divide the left rectus muscle. It was closed with a double row of Lembert silk sutures after some considerable difficulty, owing to the friable state of the surrounding stomach wall. The abdominal cavity was cleaned by sponging. A drainage tube was left in each hypochondrium, and a strip of iodoform gauze passed down to the site of the ulcer in the stomach. The rest of the abdominal incision was closed. The operation lasted an hour and a quarter.

After-History.—For the next few days she progressed favourably. There was but little shock following the operation, but a good deal of trouble from hiccup. Feeding was maintained entirely per rectum. The temperature fell to normal; all pain and tenderness disappeared, and the patient constantly expressed herself as "feeling quite well." Ten days after the operation the temperature again rose and the patient began to lose ground. The condition of the abdomen was all that could be desired, but signs of effusion into the right pleural cavity made their appearance and she began rapidly to lose flesh. There was a marked leucocytosis and other evidence of deep-seated suppuration; but although repeated explorations were made to localize it they were all unsuccessful. Food was well taken during all this time, and there was no nausea or vomiting. The temperature, however, remained continuously high, the pulse and respiration became more frequent, and she died on February 23rd, twenty-five days after the operation.

Necropsy.—The right pleural cavity was found to contain a pint of thick creamy pus. The left pleural cavity contained several ounces of clear serous fluid, and there were extensive adhesions between the diaphragm and the lower concave surface of the lung. The perforation in the stomach was soundly closed, and the anterior surface of the organ was adherent to the abdominal parietes. There were three distinct, localized peritonitic abscesses. One between the right lobe of the liver and the under surface of the diaphragm, a second between the upper end of the spleen and the diaphragm on the left side, and a smaller third collection between the transverse colon and the sigmoid flexure. There was also a large abscess in the right lobe of the liver communicating with the right sub-diaphragmatic abscess.

CASE III.—Perforation of a Gastric Ulcer, followed by Subsidence of Symptoms for Three Weeks: Sudden Onset of Acute General Peritonitis: Laparotomy: Death.—N. B., a single woman, aged 26, was admitted into the General Hospital on January 26th, 1901, suffering from abdominal pain and vomiting.

History.—Some hours previously she had been seized with acute epigastric pain whilst in a railway train. This passed off after vomiting. But feeling collapsed and faint she was brought to hospital. Three years ago she suffered from acute indigestion with vomiting. No history of haematemesis. During the last two months she has again had pain and sickness after meals; always anaemic.

Condition on Admission.—Suffering somewhat from shock. Pulse 92, temperature 96.5° . Intense pain complained of across abdomen in region of umbilicus. Abdominal respiratory movements very shallow. After admission she rapidly improved, and in a few hours all symptoms of shock had disappeared. All pain and tenderness disappeared, and temperature became normal. The only physical sign to be discovered was a pleural friction over the lower ribs on the left side. All food was withheld by the mouth for four days, and she was then cautiously fed. For nearly three weeks she progressed well, and towards the middle of February was apparently convalescent. On February 17th, at 4 a.m., she had a severe rigor. Her temperature rose to 106° . She complained of severe abdominal pain over the left side and vomited once. There was dullness and bronchial breathing with friction sounds over the base of the left lung.

Operation.—Abdominal section was performed. The stomach was found on the left side of the falciform ligament fixed to the liver by dense new adhesions. An abscess containing $\frac{1}{4}$ oz. of thick pus was opened between the liver and the stomach. A small perforation was found on the anterior

surface of the stomach, apparently closed by recent adhesions which fixed the organ to the costal arch on the left side. This was closed; the abscess cavity was sponged dry and drained. The peritonitis rapidly extended after the operation, and she died four days afterwards with general peritonitis and left-sided pneumonia.

Necropsy.—The perforation in the stomach wall was found to have taken place in the centre of a large chronic ulcer situated on the anterior surface of the cardiac end of the stomach. There was general septic peritonitis, and a large collection of pus in the left pleural cavity between the upper surface of the diaphragm and the base of the left lung.

On looking back on this case, one cannot help feeling that the fatal issue was in all probability due to our error in not operating when first the perforation occurred. But when I saw her a few hours after admission all signs of collapse had disappeared, and she appeared so well and so free from pain that I doubted whether it was justifiable even to explore to see if a perforation had actually occurred. Her progress during the next three weeks seemed to negative an actual perforation having occurred, and it was not until pus had actually formed and the peritonitis suddenly became generalized on the twenty-first day after admission that operation was undertaken, and then it was too late.

CASE IV. Perforation of a Gastric Ulcer: Peritonitis: Laparotomy and Suture: Recovery.—A. G., aged 21, a delicate, single girl, was admitted to hospital on November 5th, 1901, suffering from peritonitis.

History of Illness.—Sudden onset at 4 p.m. the day before admission of violent abdominal pain and collapse; felt sick, but did not vomit. Rapid abdominal distension.

Previous History.—Anaemia for several years; typhoid fever in October, 1890. Since then has always had pain after food, with occasional vomiting. Much epigastric tenderness. During last three months has had occasional slight haematemesis.

Condition on Admission.—Dark anaemic girl. Temperature, 101.2° ; pulse, 130; marked abdominal facies; abdomen distended; tympanitic; peritonitis, chiefly of upper half of abdomen; liver dullness present, but diminished.

Operation.—Abdominal section was performed on the evening of admission, twenty-seven hours after the perforation. A mesial incision above the umbilicus exposed the stomach and liver covered with a thick layer of lymph. On removing this a large indurated area was exposed on the anterior surface of the stomach close to the pylorus: in the centre of this was a small circular perforation, which emitted gas and gastric fluids. A double row of thick Lembert silk sutures were passed, and an attempt made to close the perforation. But the coats of the stomach were so indurated and friable that the stitches repeatedly cut through on being tied. The falciform ligament of the liver was therefore divided in its upper third and the lower portion of it applied against the perforation and fixed *in situ* with fine silk sutures. There was a considerable quantity of fluid in the peritoneal cavity, particularly in the lesser sac. This was sponged dry. The abdominal cavity was drained and a piece of gauze left in contact with the anterior wall of the stomach.

After-History.—Convalescence was uneventful. The temperature rose in the night after the operation to 101° , but never touched 100° afterwards. She was fed entirely per rectum by means of nutrient enemata for fourteen days, and experienced no thirst or discomfort during all this time. The gauze packing was removed on November 14th and the drainage tube a few days later, and she left the hospital for the Jaffray Convalescent Hospital on December 13th. While there she gained in weight 26 lb., and at present has no pain, discomfort, or digestive trouble of any kind. She expresses herself as feeling better than she has been for years.

CASE V. Perforation of a Gastric Ulcer: Abdominal Section: Death from General Peritonitis.—E. W., a housewife, aged 30, was admitted into the General Hospital on December 27th, 1901, suffering from symptoms of perforated gastric ulcer. At 5 p.m. on December 27th, whilst shopping, was seized with acute burning pain in the epigastrium. She fainted, and was sick, and was brought to the General Hospital. Three hours before her illness began she had eaten a hearty meal of pork and green vegetables.

Previous History.—For many years she had had severe epigastric pain, which came on about fifteen minutes after food and lasted for several hours. She was occasionally sick; the vomit once contained blood.

Condition on Admission.—Face drawn, eyes sunken, tongue dry; vomited every ten minutes semi-digested food and then bile-stained material. Each act of vomiting was preceded by acute abdominal pain and left her much collapsed. Abdomen full; walls extremely tense; acute tenderness over the upper half of the abdomen. Pulse 110, small; temperature 101° .

Operation.—Abdominal section was performed at 9.45 that evening, four and a half hours after the onset of her symptoms. A median incision was made about the umbilicus. A large quantity of bile-stained acid fluid was found in the abdominal cavity. The fluid had a peculiar soapy feel; there were no adhesions. An ulcer was found on the anterior surface of the stomach near the pylorus, with a perforation in it the size of a threepenny bit. Through the opening richly fluid escaped; the perforation was closed with a double row of silk Lembert sutures. There was also a considerable quantity of bile-stained fluid in the left hypochondrium. The abdomen was carefully cleansed with sponges; the left hypochondrium was drained.

After-History.—The patient bore the operation well, and though she vomited several times during that night expressed herself as much better the next morning. Food was given by means of rectal enemata. There was a copious discharge of fluid from the wound. Symptoms of general septic peritonitis, however, quickly set in, and she died on January 1st, on the fifth day after the perforation.

Necropsy.—The site of the perforation was in the centre of a large oval chronic ulcer. The perforation was securely closed. The whole contents of the abdomen were in a state of acute inflammation and bathed in thin purulent fluid.

FREQUENCY AND SITE OF PERFORATION.

The frequency with which an ulcer of the stomach perforates into the general peritoneal cavity is a subject on which authorities who are best capable of judging appear to differ considerably. Lebert, quoted by Dreschfeld, places it as low as 6.5 per cent., while Fenwick, in a series of 112 cases, has placed it as high as 28.5 per cent. It may be probably taken as occurring in about 15 per cent. of all cases of gastric ulcer. Fortunately for patients who are the subject of gastric ulcer, the majority of them exist on the posterior wall of the organ, and when present in this position usually contract adhesions to neighbouring organs before they perforate. This limits the extravasation of the stomach contents when perforation occurs.

When present on the anterior stomach wall ulcers are not so protected, and are therefore much more liable to perforate into the general peritoneal cavity. The percentage of perforations in ulcers in this position is probably not far short of 60 or 70 per cent.

SYMPTOMS AND DIAGNOSIS.

In a typical case of sudden acute perforation the symptoms are usually so pronounced as to leave no doubt in the mind of the careful observer as to what has occurred. The sudden intense burning epigastric pain, the collapse and distress, and the vomiting, all point to some perforative lesion having taken place within the abdomen. The skin is cold and clammy, respirations are shallow and thoracic in type, the pulse rapid and small. Thirst is usually a distressing symptom, and vomiting may be repeated constantly. The abdomen is at first retracted and the abdominal walls are extremely rigid. Later the abdominal walls become relaxed, retraction gives way to distension, and the symptoms of acute general peritonitis rapidly supervene.

Too much stress is apt to be laid upon the disappearance of the liver dullness owing to the presence of free gas in the abdominal cavity. It is present as a symptom in only about 50 per cent. of these cases. In only one of my cases was there free gas in the abdomen, and in that case it was present in large quantities.

A former history of gastric troubles can usually be obtained in these cases, and helps to clinch the diagnosis. But in less typical cases—cases in which there is rather a slight leak than an actual perforation—the diagnosis may be a much more difficult affair. In these cases, after the initial symptoms have passed off, there is apt to be a lull. As long as food is withheld, and the patient is kept quiet and still, there is no pain, no distress, and no vomiting; and it is in some cases quite impossible to say for certain whether an actual perforation has or has not taken place. I feel sure that in such cases the right course to pursue is to make a small exploratory incision, and to examine the organ digitally. I shall always regret that in Case III I did not adopt this course.

There are several other acute abdominal disorders, the sudden onset of which may simulate the perforation of a gastric ulcer. These must be borne in mind when the diagnosis is being made. The chief of them are: Sudden acute intestinal obstruction, such as strangulation by a band; a ruptured duodenal ulcer; acute perforation of the appendix vermiformis; ruptured tubal gestation; and haemorrhagic pancreatitis; poisoning by acute gastric irritants; and the various forms of colic, particularly biliary and renal. The diagnosis of some of these disorders from a perforated gastric ulcer may be at times well-nigh impossible; but in the majority of cases a careful attention to the clinical symptoms and clinical history of the patient will enable a correct diagnosis to be made.

MODE OF OPERATING.

After the many brilliant successes of surgical interference in this well-nigh hopeless complication, one need not dwell upon the extreme urgency of immediate operation, but a few remarks upon the operation itself may not be out of place. Everything should be done to expedite the various steps of the operation, and to minimise its shock upon a patient who is already in a state of extreme depression. The operating room must be warm, the operating table artificially heated, and the patient warmly clad and not unnecessarily exposed. Towards the close of the operation the intravenous injection

of one or two pints of normal saline fluid is also of great value in counteracting the shock.

The stomach is examined through a median abdominal incision, which may be enlarged by means of a horizontal incision through the left or right rectus muscle, as may seem most useful when the perforation has been localised. The stomach is to be systematically examined first of all on its anterior surface, and if no perforation is discovered the posterior surface may be examined by tearing through the gastro-hepatic or gastro-colic omentum. Thick flakes of lymph will generally guide us towards its actual seat.

The perforation when discovered is to be closed by a single or double row of Lembert sutures. These may be passed with ease when the seat of the perforation can easily be brought into view, when the perforation is small, and when there is not much surrounding induration. On the contrary, when the perforation is a large one, and the stomach wall around much indurated, this may be a matter of great difficulty, as it is almost impossible in these cases to invaginate the edges of the ulcer, and to prevent the sutures cutting through the friable stomach wall.

In such cases we may bring up and fix *in situ* a piece of omentum or some neighbouring viscus. In one of my successful cases the round ligament of the liver was so utilized.

The perforation being closed the abdominal cavity must be cleansed from any stomach contents which may have escaped into it. In some cases there has been but little such leakage; and in such cases the area around the perforation is best cleansed by careful sponging.

But when there has been much leakage through the perforation the whole abdominal cavity needs cleansing. The best mode of so doing is to systematically and thoroughly irrigate the whole cavity with hot saline fluid. Many pints of such fluid must be used, and it must be made to penetrate into every part of the cavity, special care being taken to cleanse the lumbar regions on each side and the peritoneal recesses between the liver and diaphragm. When all excess of this fluid has been removed a drainage tube should be passed into each loin, and a third to the bottom of Douglas's pouch. This latter tube is best brought out through a counter-opening made above the pubes.

AFTER-TREATMENT.

The two chief points in the after-treatment are the feeding and the treatment of shock.

The shock of a prolonged operation in an already-depressed patient is apt to be extreme. The intravenous injection of one or two pints of normal saline fluid at the close of the operation is of great value in these cases, and is to be supplemented by hypodermic injections of strychnine and brandy enemata.

No food should be given by the mouth for the first three or four days, or for a still longer period if the patient's strength is being maintained.

During this period nutriment is to be given entirely per rectum. It is my habit to give alternately every four hours an enema of 4 oz. of peptonized milk, and one of the same quantity of peptonized raw meat juice.

Once every 24 hours a pint of warm saline fluid is slowly injected into the bowel high up and allowed to remain there. In one of my cases feeding was in this way carried on entirely per rectum for fourteen days, and during the whole of that time the patient complained of nothing worse than an occasional slight thirst. When food is afterwards given by the mouth, great care is of course necessary in its administration at the commencement.

PROGNOSIS.

The prognosis in any given case of perforated gastric ulcer will depend upon several factors.

First of all, on the condition of the stomach when the lesion took place. If the organ be empty there can be little or no extravasation of stomach contents. But if the perforation take place when the stomach is full of semi-digested food, and the perforation a large one, there will be large escape of highly-irritating material into the abdominal cavity, and the consequent peritonitis will be earlier and more dangerous.

The presence or absence of vomiting in the interval between the actual perforation and the operation has also a bearing on the prognosis. In some cases—fortunately only in the

minority—retching and vomiting are continually repeated, and these are particularly bad cases owing to the consequent escape of stomach contents into the abdomen. (According to Fenwick, vomiting occurs in about 29 per cent.)

The actual interval of time which elapses between perforation and operation also influences the prognosis. The longer the irritating material is allowed to lie in the abdominal cavity the greater the danger of a fatal septic peritonitis. The evil of delay in these cases is well brought out in the table given by Robson and Moynihan in their *Diseases of the Stomach*, p. 161.

Interval between Perforation and Operation.

	Death-rate.
Under 12 hours	28.5
12 to 24 hours	63.6
24 to 36 hours	87.5
36 to 48 hours	100.0
48 hours and over	51.5

At the operation the size of the perforation, the number, and the seat of the perforation all exercise an influence on the result.

In 20 per cent. of the recorded cases, according to Mayo Robson, more than one perforation has been discovered when operation was undertaken, and each perforation naturally adds to the risk and gravity of the case. The magnitude of the perforation adds to the risk in two ways. First, the larger the hole the greater the amount of extravasated stomach contents which will be found at the operation; and secondly the magnitude of the perforation increases materially the difficulties and dangers of securely closing it.

Fortunately perforations are rare on the posterior wall of the stomach, but when they do occur in this situation their secure closure is a matter of great difficulty. Even when on the anterior wall, if the ulcer is situated high up under the ribs near the cardiac orifice its exposure and dullness is often a matter of extreme difficulty. Lastly the presence or absence of stomach contents in the abdomen largely influences the result of the case.

In Case v, although operation was undertaken within four and a-half hours of the perforation, yet the whole upper half of the abdomen was found already soiled with acrid stomach contents, and in spite of careful cleansing a fatal peritonitis quickly followed.

If general peritonitis is found well advanced when operation is undertaken, the case is well-nigh hopeless, and this accounts for the extremely bad results obtained in late cases.

What the actual mortality-rate and recovery-rate is after abdominal section for this perforative lesion is a hard matter to decide. For, as is only to be expected, the majority of the successful cases are put on record, while the unsuccessful cases never see the light of day except in hospital statistics.

Tucker¹ places the recovery-rate from recorded cases during the previous three years at 83.7 per cent. This figure is much too high, and probably the figures given by Mayo Robson are much nearer the mark. He has collected from medical literature 486 cases, with 227 recoveries and 259 deaths. This would give a recovery-rate of 44.6.

I have endeavoured to collect all the cases operated upon in one or two large London and provincial hospitals during the last five years, including only those where upon operation an actual perforation was seen and sutured. I find that in those institutions there have been in all 40 cases of suture of perforated gastric ulcer, with 14 recoveries and 26 deaths. This would give a recovery-rate of 35 per cent., a figure much lower than that usually given, but probably nearer the real truth.

REFERENCE.

¹ *Philadelphia Medical Journal*, February, 1900.

A MUZZLING order for South-West Wales was issued on July 1st.

REMOVAL OF ONE-THIRD OF THE STOMACH WITH THREE AND A-HALF INCHES OF DUODENUM FOR CANCER.

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THE following case was handed over to me from the medical side of the Cardiff Infirmary by my friend and colleague Dr. Donald Paterson as a suitable case for operation. The case is worthy of record on account of the unusual length of duodenum removed, which necessitated closure of the duodenum and completion of the operation by a gastro-jejunosomy. In this particular case, after closing the end of the duodenum by a continuous suture through all its coats beyond the clamp, it was found very difficult to efficiently close the duodenum on account of its retraction when the coprostatic forceps was removed, and also on account of not having any peritoneum on its posterior surface. Fearing trouble from the end of the closed duodenum, I put in two rows of a continuous suture in opposite directions, and afterwards managed to get a Lembert suture over the end of the duodenum by attaching the peritoneum on its anterior surface to that upon the anterior surface of the pancreas. Apart from this particular difficulty the operation was of the usual nature, necessitating much patience and the observance of many details to ensure success. I would venture to remark that indiarubber protection to clamps in intestinal or gastric surgery is quite unnecessary, and that it is a source of difficulty in all such operations on account of the unsatisfactory methods of rendering indiarubber sterile except by boiling, and also because it transforms delicate clamps into bulky and clumsy instruments. I have not used indiarubber on any clamps for some years, and have never seen any injurious effect from naked clamps used upon stomach and intestine, although the clamps I use are more powerful than those of Makins or Rydygier's patterns. Most English writers on intestinal surgery recommend indiarubber as if it possessed the power of diminishing the elastic force of the clamp, and consequently of minimizing the prospect of necrosis of the intestine at the clamped area. The bogey of causing necrosis by the use of clamps is very widespread, and I have also frequently heard it expressed in connexion with the use of my forceps-tourniquet in controlling hæmorrhage during amputations. However plausible the arguments in favour of such a contingency may be in theory, I feel quite sure, from much experience, that such fears are not realized in practice when the surgeon observes the rigid exclusion of pathogenic germs and the strict prohibition of the use of antiseptics during the performance of an operation.

I have opened the abdomen upon 7 occasions with the intention of removing cancerous tumours of the stomach, and it is in only 2 out of the 7 cases that I considered it advisable to resect the growth after careful inspection of the local condition. In 5 of the cases physical signs and careful examination gave no clue to the existence of secondary growths in the liver before the performance of a coeliotomy; in some the secondary growths were very numerous and small; in others they were few, and only discovered after a minute inspection of the under surface of the liver. In all these cases the secondary growths did not project from the surface of the liver; they were like currants in a cut cake. It is generally admitted that on occasions there is much difficulty in diagnosing a pyloric or gastric tumour; but in those cases where we are absolutely confident as to the location of the tumour, we are completely in the dark as to whether it is justifiable to remove such tumours until the abdomen is opened, on account of the fact that the growth may have extended too far beyond the manifest swelling without giving rise to any recognizable symptoms. The mobility of a tumour of the stomach is also very deceptive, even after opening the abdomen, and was well exemplified in my second case, where I removed about three-quarters of the stomach successfully. After dividing the stomach between two clamps near its cardiac end, and whilst carrying its separation from the omenta towards the pylorus, I then