tration, which represents a culture sixteen days old from a patient, M. 22; but if compared with a cultivation of *S. albus* grown side by side, it seemed to have a whiter, almost a bluish-white, translucent appearance; it was thinner, and the cultures never grew in tiers, such as a *S. albus* culture sometimes does. Plate cultivations of gelatine or agar presented at the end of three to six days two sorts of colonies—cloud-like colonies (resembling cirrus or cirro-stratus), and spherical or sand-grain colonies—which may or may not resemble *S. albus*. But such cultivations were slower to mature than others of *S. albus* made for the sake of comparison, taking about three days in the cold chamber (20° C.), and about five or six days in the hot (35° C.). Under the microscope the cocci were apparently smaller, though this may have been from immaturity, and they seemed specially prone to occur as diplococci; though when met with in masses it is sometimes difficult to tell whether they are cocci or diplococci. I wish to speak with all reservation, because these experiments require extension and control, but it seemed almost as though one had to do either with a new diplococcus, or with a mixture of such and staphylococcus albus; or possibly the phenomena are the result of a modified or unhealthy form of staphylococcus.

These cocci were uniformly present in the serum; whether they are always to be found in the blood, skin, and tissues remains to be seen. The intimate relation which many of them bore to the epithelial cells which adhered to the cover-glasses is another interesting feature, as Professor Klein pointed out.

The experiment with the rabbit is interesting, but standing alone proves nothing. The desquamation of the epidermis, in an animal whose skin was previously quite smooth and healthy, is a suggestive fact, and will serve to indicate the line for further research.

A SUCCESSFUL CASE OF GASTRO-ENTEROSTOMY.

By ARTHUR E. BARKER, F.R.C.S.,
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THE following case of gastro-enterostomy for disease about the pylorus offers sufficient points of interests to justify its publication. It is only the second in which this operation has been performed at University College Hospital within the last five years, which in itself is a point worth noting. It furnishes some evidence as to the frequency with which we may expect to meet with cases in which the patient's condition seems to demand relief by this operation; for though my first case,¹ which was also the first successful one in this country, showed the operation in its best light both as to immediate recovery, relief of distress, and prolongation of life, and so far encouraged us to look out for others in which it might confer a similar benefit, no such case has occurred until the present, although doubtless many instances of malignant disease of the stomach must have been under observation in the hospital within the period mentioned. This tends to confirm an impression I have always had—namely, that gastro-enterostomy will only be called for in a comparatively small proportion of cases of disease about the pylorus; but, on the other hand, I fully believe that in certain cases this operation is capable of giving great relief, and also probably of prolonging life. Other points of interest about the case will best be discussed after it has been described from a clinical point of view.

J. H., aged 55, an engine fitter, was admitted into University College Hospital on June 10th, 1891, under the care of Dr. G. V. Poore. He complained of loss of flesh, anorexia, general weakness, and constipation. Three weeks before admission patient had to take to bed on account of extreme prostration and inability to do his work. He began to feel unwell a year ago, complaining of indigestion and pain in the stomach, and later of vomiting. The latter symptom ceased after a time, but he never regained his digestive powers. There was no family history of cancer, and he has lived well and wholesomely.

After admission he was observed to vomit frequently, and

the ejected matter was sometimes like "coffee grounds." He could take no food except a little milk or cocoa, and complained of epigastric pain. The stomach was moderately distended. The temperature was usually subnormal. On July 1st a tumour the size of a small orange was felt just above the umbilicus. This was hard but fairly movable, and there could be little doubt, in view of the symptoms, that it was a mass of carcinoma about the pylorus obstructing the latter. As the patient was becoming very emaciated and unable to digest any food capable of keeping up his strength, his condition was explained to him by Dr. Poore, and also the possibility of relief by gastro-enterostomy. To this the patient at once responded by asking that the operation should be done as soon as possible. Dr. Poore then kindly placed the case in my hands, and I again explained to the patient, who was a most intelligent man, the whole bearing of his case. He expressed himself as anxious for the operation at once.

Having made all the usual preparations for this operation, first by frequent cleansings of the whole surface of the body, and then by washing out the stomach with hot water in large quantities, followed by a solution of sod. salicylate gr. x to ʒj, the operation was performed on July 10th, at 1.30 P.M., the patient being wrapped up in cotton wool from head to foot—as is the case with all my cases of abdominal operations.

I first made a 4-inch incision in the middle line above the umbilicus, and, having checked all bleeding points, opened the peritoneum. The growth was immediately seen beneath the wound, seated in the anterior wall of the stomach, its centre being about 1½ inch from the pylorus. It was about the size of a small apple. A few adhesions fixed it to the abdominal wall, and these were torn through and the mass was drawn out of the wound with the stomach wall, which was white and considerably puckered over the growth. Feeling sure that the patient, in his very weak state, could not bear the long operation of pylorotomy, I at once proceeded to perform gastro-enterostomy.

The anterior wall of the stomach having been caught up and held by an assistant, I turned the omentum and colon over to the right side, and caught up the jejunum about 12 or 15 inches from its origin, which could be clearly seen by myself and colleagues when the wound was held open. Having then packed the latter with sponges I opened both viscera by incisions about 1½ inch long. Little or no fluid escaped, and what came away was easily taken up by sponges. Senn's decalcified plates were then inserted and brought together in the usual way but with some little difficulty, the silk threads having been crossed by inadvertence. When the latter were drawn tight and knotted it was quite plain that the plates slid over one another laterally, and did not bring the incision directly together one over the other. I therefore sutured the walls of the viscera round the plates by continuous sutures of fine silk. The junction now seemed to be secure, and after careful toilet of the surrounding parts the wound was closed in the usual manner by hard twist silk. The operation lasted from beginning to end exactly 48½ minutes, and the patient bore it on the whole well. When he recovered from the chloroform he expressed himself as feeling much better than he expected. At 8 P.M. he had 2 minims of inj. morph., and at 11 P.M. 2 minims more. There was no sickness at all, temperature 96°, pulse 120.

July 11th, 10 A.M. Temperature 97.6°. Has had no food since operation. Was now ordered ʒj of peptones every two hours, and a peptonised beef and milk suppository every six hours, alternately with an injection of plain hot water at 105° every six hours, only 5 ounces at a time. At 3 P.M., temperature 98.2°. In the evening he passed water for the first time since the operation to the extent of 13 ounces. He looked very weak, but had no pain. For the following night he was allowed ʒij of peptones every two hours by the mouth, alternating with ʒij of water. Rectal feeding as before.

July 12th. Patient is stronger; temperature 98.4°. In addition to former nourishment to take ʒss of arrowroot on water with ʒj of brandy every two hours. In the evening arrowroot stopped, as patient felt distended. Temperature 98.8° (the highest point recorded during convalescence). Two minims of liq. morph. To take ʒss peptones every two hours. Rectal feeding as before.

July 13th. Distinct improvement. Temperature 98.4°, pulse 112. Peptones increased to ʒss every hour.

¹ Vide BRITISH MEDICAL JOURNAL, February 13th, 1886.

July 14th. Patient's condition in every way satisfactory. Pulse 84, stronger. To have beef-tea $\frac{3}{4}$ every two hours, also sweetbread and $\frac{3}{8}$ ss of tea. A small marginal ulcer has appeared over each cornea, from sleeping with eyelids not quite closed.

July 15th. Temperature 96.8°, pulse 84. Eggs and milk. Champagne $\frac{3}{8}$ ss every two hours, also scraped boiled mutton.

July 16th. Boiled sole and boiled lettuce; iced soda water; $\frac{3}{4}$ of port wine.

From this on there is nothing special to note except steady improvement and healing of corneal ulcers. The dressings were removed for the first time on July 20th, and the wound was found perfectly united *per primam*. On July 26th the patient sat up in a chair for the first time. Bowels regular for several days past. On August 7th he had some bronchitis, but was up and about the ward.

The last note before leaving hospital on August 14th runs thus: "Patient went out to-day. He could walk about the ward, and was sitting up all day. His eyes are quite well. He enjoys his food, and is not sick. Breath rather foul. The tumour can be felt; it seems to be larger than before; no pain, no melæna. Temperature rose to 102° yesterday, but came down quietly." I may add that patient was in excellent spirits, and much given to joking. He was rather inclined to take too much food. He was, however, still 2 lbs. lighter than before operation, though gaining strength and walking about. Temperature 99.8°.

When the patient left hospital he went to the Convalescent Home at Hemel-Hempstead, where I heard of him through the kindness of the medical officer. His appetite was more than good, and he seemed inclined to do well. On August 25th, however, he died, with all the symptoms of acute pneumonia which had rapidly developed. The medical officer having courteously informed us of this fact, our surgical registrar, Mr. G. White, and house surgeon, Mr. Ionides, kindly went down to be present at the necropsy. Mr. White's notes are as follows:

"August 26th.—The body was very emaciated; all the organs were healthy, except the lungs and stomach; they all showed a marked absence of fat.

"Lungs: Lower lobes of both almost solid, but crepitating throughout. Bronchial tubes full of brownish, frothy, mucus. The solid or nearly solid portions of the lungs have on section a granular surface, reddish-brown in colour, mottled with black streaks and dots. In the same parts of the lungs there are small foci, none much larger than a pea, in which the lung is breaking down, so as to form in some cases small localised abscesses, in others a necrosis of the lung tissue without the obvious formation of pus. The condition appears to be one of septic lobular pneumonia.

"Stomach and duodenum: The pyloric end of the stomach in the neighbourhood of the growth is adherent to the abdominal wall by old adhesion. The jejunum, $12\frac{1}{2}$ inches from the pylorus, is attached to the anterior wall of the stomach. The area of adhesion is as nearly as possible circular, and measures just two inches in diameter. Towards the right it reaches to the pylorus; its lower margin lies $\frac{3}{4}$ inch above the great curvature of the stomach. Towards the upper part of the attachment here and there a stitch can be seen covered over by thin transparent membrane.

"Opening the stomach along the lesser curvature a circular aperture, $\frac{1}{2}$ inch in diameter, can be seen in its anterior wall. The margins are smooth, but very thin. The mucous membrane of the stomach and duodenum meet over the margin of the aperture, but the line of union cannot be detected. A double silk thread $2\frac{3}{4}$ inches long is found at one end piercing the mucous membrane of the aperture, the other end lying free in the stomach. The exact position of the aperture is as follows: It lies $2\frac{1}{2}$ inches to the left of the pylorus, $1\frac{1}{2}$ inch from the lesser curvature in a vertical line, and $2\frac{1}{2}$ inches above the greater curvature. The pylorus will admit a No. 12 English catheter comfortably. In the anterior wall of the stomach just to the left of the pylorus is a hard mass of what appears to be new growth. The mucous membrane is everywhere intact. The mass forms a thick ridge on the anterior wall of the stomach, standing out fully $\frac{1}{2}$ inch, so as to form a kind of valve to the pyloric opening. There are some enlarged lymphatic glands in the lesser omentum along the course of the hepatic and portal vessels, and one was

found in the transverse fissure of the liver. They appear to contain new growth. The duodenum is empty, but not obviously contracted; the jejunum, just where it is attached to the stomach, is dilated, its walls being very thin. The stomach contains no food. Nothing is seen anywhere of Senn's plates. The flexion of the bowel at the point of attachment has not caused any obstruction to the proximal portion. The great omentum is found lying in the left side of the abdomen. No growths are to be found in any other parts of the body."

Microscopical examination by Mr. White showed the tumour to be an ordinary columnar carcinoma. The only special point to be noted about it was that the fibrous stroma was very abundant and the loculi unusually small. The first point of surgical interest which struck me in the above operation was the ease with which the upper part of the jejunum was reached and identified. On simply turning over the omentum and colon to the right, the commencement of this part of the bowel as it emerges in front of the spine from under the mesenteric artery could be as easily seen as possible. This has often been found a great difficulty in other operations, namely, to identify the upper part of the small bowel, but here it was a very simple matter. This I attribute more than anything to the fact that there was no obstacle in the way of pushing the omentum and colon to the right. The patient was so thin and his intestines so empty that the latter were easier to manipulate than usual, and certainly than in my first case. This certainly contributed to shorten the duration of the operation, which only lasted forty-eight and a half minutes against ninety-six minutes in my first operation. Whether the use of Senn's plates also contributed to the saving of time I am not so certain. They certainly were not so simple in use as I expected, and when the threads were drawn home they still slipped from side to side in a way that convinced me, as I believe it has convinced others, including the inventor, that further suture around them is necessary for perfect safety. Of course greater familiarity with their use might modify this impression, but I finished the operation with the feeling that, had I to do it again, I should employ the method of suture which I had devised for my first case. I felt almost certain that by my own method I could have finished the operation within less time than in this case with Senn's plates, and with a more secure suture.

The after-treatment of the wound requires no notice. The first dressing was not touched for twelve days, and then the wound was found to have perfectly healed *per primam*, as all such wounds ought to heal.

As regards the feeding of the patient immediately after the operation the first principle was to adopt early alimentation by the mouth. This was begun with albumoses twenty hours after operation, and in increasing quantity. On the fifth day, and from that on, he was given solid meat. Feeding by the rectum was carried on from the beginning, and small hot-water injections were given *per rectum* regularly, as in nearly all my abdominal cases. These relieve thirst while resting the stomach, and at the same time make up for waste of water from the body by lungs, kidneys, and skin. When shock is present I know no better restorative than a hot-water enema. In this case our course of dieting was rendered easy by the fact that the patient had no sickness at all after operation. Indeed the operation appeared to have but slightly disturbed him, and when he began to take solid food and vegetables, in a few days his spirits rose to a high pitch, for he had not done this without great distress for months past. The speedy reappearance of natural motions without any abdominal distress, showed that the new channel was working without a hitch. In short his whole condition during convalescence left little to be desired. That he should have been attacked by pneumonia in the seventh week while away in the country is of course to be deplored. But when we remember the weather of last summer we need not feel surprised that a delicate man should be attacked by a malady I believe common at the time.

His death, however, has furnished us with an interesting specimen showing how the artificial pylorus of gastro-enterostomy looks in the seventh week after operation. Here Mr. White found perfect union of the mucous membrane of both viscera over the edges of the opening, which was of full size

for the passage of food. In this case there was no tendency to "kinking," of the jejunum at the attached point, such as has been found in other cases, and there was no obstruction to the flow of the contents of the duodenum at the point attached to the stomach.

Another point is of interest as confirming what I have observed in numerous other cases of intra-abdominal suture, namely, that fine sterilised silk will lie in the coats of the bowel for an indefinite time without producing the slightest irritation. Mr. White's observation that the obstruction to the pylorus was rather from a valve-like action of the fold-like growth than from actual invasion of the sphincter, is of much interest, though, of course, with extension of the neoplasm the latter would soon almost certainly have been involved and directly blocked.

The avidity with which this patient took food and the completeness with which he digested it, as evidenced by the regularity and amount of his motions, is also interesting, and speaks well for the completeness of the functions of the new pylorus as contrasted with the old. It is only to be regretted that an intercurrent lung affection should have shortened his life and deprived us besides of the satisfaction of seeing the new condition of things leading on to its full fruition.

PERFORATION OF GASTRIC ULCER AND ITS TREATMENT BY ABDOMINAL SECTION AND SUTURE.

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AND

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WE have published elsewhere¹ a full account of a case of latent gastric ulcer which perforated, and for which abdominal section was performed, the patient dying the next day. The patient, a girl, aged 22, stooping to pick something off the floor, was seized with violent pain in the abdomen, collapse, and vomiting. Six hours later, in addition to these symptoms, there was rigidity of the abdominal muscles, tenderness on palpation, and some distension. There was nothing in the history to suggest gastric ulcer, so the abdomen was opened in the usual position below the umbilicus, and a careful search made for any inflammatory focus which might have burst and set up the severe peritonitis which obviously existed. None being found the wound was closed, and a drainage tube was placed in the pelvis. At the necropsy a perforated gastric ulcer was found on the anterior wall of the stomach about midway between the curvatures, and rather nearer to the cardiac than to the pyloric end. It was greatly to be regretted that nothing in the history of the case suggested the existence of the ulcer, as it was in a position where closure by suture might have been effected with some hope of a successful termination to the case.

Since the publication of this case the following has come under our care, and it seems of sufficient importance to place on record.

A girl, aged 20, was admitted to the General Hospital on Monday, October 12th, 1891, with a history of indigestion of some years' duration, and of a sudden severe pain in the left upper part of the abdomen, with moderate sickness on the Saturday. She did not feel very ill when she came to the hospital, had no fever, and was not sick, but she was admitted because she had had this acute attack of pain two days before, and said that three years previously she had been under treatment for gastric ulcer, although there had never been any hæmatemesis. She was ordered a mixture of bismuth and morphine, and passed a comfortable night. When seen on the following morning (the 13th) she was found to be rather collapsed, eyes somewhat sunken, and pulse 126, feeble and compressible. The abdomen was slightly distended, tympanitic, and very tender on palpation, especially in the epigastrium and the right hypochondrium; the abdominal muscles were tense, and the patient resented examination; there was no sickness, and though appetite was lost there was no complaint of pain after drinking milk and water, to which the diet was restricted.

With the view of relieving the distension 15-minim doses of ol. terebinth. were ordered to be given every four hours. About 3 A.M. that night she complained greatly of pain, began to vomit a green bilious fluid, and became much more collapsed. When seen in the morning it was evident that her condition was critical; the pulse was 150 and wiry, the eyes were sunken, and the face very anxious. The abdomen was more distended than be-

fore, and very tender. Whatever the cause, it was recognised that she was suffering from peritonitis. It seemed, after consultation, to be reasonable to associate her condition with the sudden onset of the pain four days earlier, and, to be imperative, if relief were to be obtained, to investigate its cause by abdominal section.

Operation.—The presence of a gastric ulcer which had perforated being strongly suspected, the abdomen was opened by an incision in the middle line above the umbilicus, and this was eventually extended to within an inch and a-half of the ensiform cartilage. The incision revealed slight peritonitis of the parts first exposed, namely, the lower margin of the stomach and the upper margin of the transverse colon, and enlargement of the wound upwards discovered a collection of semi-purulent fluid between the right lobe of the liver and the stomach. This being cleaned away, a finger was passed over the anterior surface of the stomach, and a perforation with indurated margins was felt about the middle of the organ, from which a quantity of watery fluid escaped. Several ounces having been withdrawn from the stomach by a piece of tubing, with the utmost difficulty the organ was drawn down so that the perforation could be seen. It was found to be circular and about $\frac{3}{4}$ inch in diameter. Five points of silk suture on Lembert's method were inserted, the tissues of the stomach wall bearing the strain on them well; but the position of the perforation entirely within the abdomen, in close proximity to the under surface of the liver, and the considerable distension of the abdomen, made the suturing extremely difficult. The abdominal cavity was now flushed with hot water and a Keith's tube placed between the liver and stomach, where the most advanced inflammatory mischief had been found. Nutrient was ordered *per rectum* only, the lips being simply moistened with water occasionally. There was a good deal of collapse by the time the operation was ended, and though for some hours there was an attempt at improvement, the symptoms of an advancing peritonitis prevailed, and the patient died thirty hours after the operation.

At the necropsy well-marked peritonitis was found, especially in and around the portal fissure, and about a pint of thin purulent fluid escaped from the cavity of the abdomen and pelvis. The perforation on the anterior surface of the stomach, about midway between the extremities and somewhat nearer the lesser than the greater curvature, was effectively closed by the sutures, and adhesions existed between the opposed peritoneal margins. A second ulcer was found on the posterior wall of the stomach, opposite to the one sutured; this was nearly perforating.

In commenting upon the two cases, though both of them ended in death, we still do not hesitate to urge the necessity for operation for perforated gastric ulcer. If left without operation, death in from one to two days follows in a large majority of cases; of the minority, nearly all die in a few days or weeks from mischief extending into the abdomen or thorax, or from a secondary perforation. Relief by operation has hitherto been rarely attempted; but once the possibility of this has been realised by the physician and surgeon alike, and operation is resorted to early after the perforation has occurred, it appears to us that success in a proportion of cases ought to follow.

From the literature of gastric ulcer, it is difficult to determine accurately the commonest position of ulcers which perforate. Although a very large proportion of ulcers is situated on the posterior wall of the stomach, yet actual perforation of these is quite frequently prevented by the presence of adhesion to adjacent organs, especially the left lobe of the liver and the pancreas; whilst ulcers on the anterior walls of the stomach, though relatively few in number, have a much greater tendency to perforate, owing to the absence of adhesions. This question of the position of the perforation is, however, for our purpose, not a matter of great importance, as in any case abdominal section is called for. If, when this is performed, the leaking point cannot be discovered, or from its position cannot be closed by suture, the evacuation of the escaped contents of the stomach should be effected, and, after flushing, a drainage tube inserted, and by prolonged rest of the stomach time gained for adhesions to close the perforation. If, on the contrary, the perforation is in an accessible situation, it should be carefully sutured, though the patience and dexterity of the surgeon may be taxed considerably to effect this.

The presence of a considerable quantity of fluid in the lower part of the abdomen and the pelvis in our second case, suggests the wisdom, when a widely spread peritonitis exists, of making an opening just above the pubes for the sake of draining there as well as at the site of the operation.

Cases of perforation naturally range themselves into two classes, each of which is typified in our two patients. In the one there is the immediate severe collapse, with severe pain, vomiting, and the onset of a rapidly spreading severe peritonitis, these conditions being due to a free escape of stomach contents, often induced by some exertion on the part of the patient. In these cases, given a previous history of gastric ulcer, the diagnosis is not obscure, and the indications for operation are clear. In the other class, of which our second case is an example, there is more difficulty in making a dia-

¹ Birmingham Medical Review, August, 1891.