Operation.—Notwithstanding the freedom of the rings, I at once determined, in the light of the former case, to explore the right inguinal region with the result that I found a loop of intestine strangulated in a sac which had been bodily pushed back into the abdomen. This exploration, however, was made through an incision in the middle line, since my *confères* did not attach so much importance to the history as I did myself, and the incision adopted would have allowed of a better exploration of the abdomen had my diagnosis been at fault. The patient recovered without a bad symptom.

I venture to think this a most interesting case. The patient had evidently pushed back the sac with its contents some two months previous to the onset of his symptoms into the abdomen, where it had remained quiescent till, I imagine, some slight digestive disturbance, by interfering with the circulation through the gut, determined the strangulation.

Yet another somewhat similar case came under my care last December.

History and Condition on Admission.—The patient, aged 58, was admitted into my male ward with repeated faecal vomiting, severe abdominal pain, and constipation. The abdomen was greatly distended, hard, rigid, resonant, and tender all over. No external hernia could be discovered, and nothing was felt in the rectum. The patient was in intense pain, and it was very difficult to obtain any history from him. By persevering in our questioning, however, we elicited that two days before he slipped whilst getting off an omnibus, and a left inguinal hernia, for which he had worn a truss for some years, came down. He could not get it back at the time, but managed to do so in the evening by using a good deal of force.

Operation.—I attributed his trouble to the hernia, and found, on opening the abdomen, that in forcing back the hernia he had ruptured the intestine at the seat of stricture. The wound in the gut was closed with Lembert sutures, and the peritoneal cavity, which was filled with liquid faeces and acutely inflamed, thoroughly flushed out. The patient, however, sank and died the same evening.

I have met with two other cases of auto-reduction similar in many respects to those just related, in which I have been called on to open the abdomen on account of obstruction. But I have not been able to lay my hands on these notes, as the cases were not admitted directly under my care.

During the last few years I have thus met with 7 cases of abdominal obstruction due to auto-reduction of a hernia *en masse*. Unless therefore my experience has been exceptional, I think I am right in concluding that the condition cannot be a very uncommon one.

A review of these cases would seem to show that the diagnosis may be attended with considerable difficulty. I have already dwelt on the importance of not relying solely on our own observation of the hernial rings, but of obtaining at the same time an accurate history from the patient or his friends, not always so easy a task as one might suppose. Thus not only as in other abdominal cases are the patient's mental faculties often dulled through the intensity of the pain and through his anxiety over the gravity of his condition, but he is also frequently partly stupefied by the injudicious administration of morphine or other narcotic. Moreover, he may have effected the reduction *en masse* with very little pain, or, indeed, with very little more trouble than he usually experienced in putting back his rupture, and sometimes, as in one of the cases I have related, at a considerable period from the onset of the symptoms. So little impression therefore may have been made on his mind, that he may altogether have forgotten the circumstance, or may consider it of no great significance, and fail to mention it unless specifically questioned on the point, and not even then, as in the case of the patient just alluded to.

The importance of an early diagnosis can hardly be overestimated. All who have any experience of abdominal operations in which the integrity of the coats of the alimentary canal are implicated know how much success depends upon limiting our manipulations to the smallest possible area, and upon the celerity with which we can complete our work. Given an accurate diagnosis and early surgical interference before the integrity of the intestinal wall has been seriously affected, the strangulated gut can be at once cut down upon, the operation can be quickly completed with very little disturbance of the abdominal contents, and with almost a certainty of success, whereas the reverse would probably be the case if the diagnosis is only made during a prolonged exploration attended by free manipulation of the intestines and consequent general implication of the peritoneal cavity.

THE American Medical Association will hold its fifty-fourth annual meeting at St. Paul, Minnesota, from June 4th to 7th.

SOME PRACTICAL POINTS IN THE DIAGNOSIS AND OPERATIVE TREATMENT OF PERFORATED GASTRIC ULCER.*

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THE subject of the diagnosis and treatment of perforated gastric ulcer is one which has received considerable attention within the last seven years. It has excited the interest of both physicians and surgeons, and caused many instructive papers and statistical tables to appear in our journals.

STATISTICS.

Previous to the year 1893 Mikulicz collected 35 cases, of which only 1 recovered, but within the next three years he was able to collect 68 more cases, with 47 per cent. of recoveries. In the three years, 1895-1897, A. E. Barker collected from English sources 107 cases, with 49 per cent. of recoveries, and Mayo Robson last year gave a list from all sources of 429 cases, with 45 per cent. of recoveries.

I do not lay much stress on the foregoing lists, although fairly extensive, but I would rather trust to the following small lists by individual operators recording honestly both failures and successes: A. E. Barker up to the end of 1897 had operated on 9 cases, with 3 recoveries, or 33 per cent. Mayo Robson up to 1900 had operated on 6 cases, with 50 per cent. of recoveries; and A. B. Mitchell up to the same date had operated on 6 cases, with a similar result. Mitchell also gives a very interesting list of all the cases, including his own, treated in Ulster, which amount to 14, with 7 recoveries, or 50 per cent. We may, therefore, close the old century with the assurance that when failures and successes are added we can claim between 45 and 50 per cent. of recoveries from an accident which but seven years ago was practically a death warrant.

ADVANTAGES OF EARLY OPERATION.

The first thing which strikes us on analysing the statistics is that the time lost between perforation and operation is of vital importance. In Barker's English list 42 cases were operated upon within 12 hours with 76 per cent. of recoveries. After 12 hours the recoveries were only 25 per cent. In his personal list 5 cases were operated upon within 12 hours with 60 per cent. of recoveries, 3 were operated upon after 24 hours, and all died. In Mayo Robson's personal cases 3 were operated upon within 24 hours and recovered, 3 after 24 hours and died. In the Ulster list 8 cases were operated upon within 12 hours with 64 per cent. of recoveries, 6 were over 12 hours with only 33 per cent. of recoveries. Earlier diagnosis is, therefore, the first hint we get for the future.

SEX.

The practical lesson we learn from the recent discussion of the subject is that gastric ulcer is a common disease of both sexes. On adding Barker's and Mitchell's lists we get 108 cases of which the sex is stated, and of this number 93 were women and 15 men; but when we come to look at the termination of the 15 cases we find that only 3 males recovered. We have not far to go for an explanation, for these cases fall into the category of cases undertaken after the lapse of 12 hours, and we see that this excessive mortality in the male sex is wholly avoidable if we take as a second hint to think just as much of gastric ulcer when called to an acute abdominal case in a man, as we would if we were called to see an anæmic girl under like conditions.

The following cases illustrate the foregoing points. Two were men and two were women; 2 were operated upon within 13 hours, and of these 1 recovered and 1 died, but it is open to doubt whether the fatal case had not perforated many hours before the time I count from. The other 2 were operated upon respectively 19 and 31 hours after perforation, and both died.

CASE I.

On November 8th, 1899, at about 5 P.M., my colleague, Dr. Lumsden, called for me to see a female patient, in consultation with him, whom he had just admitted to Mercer's Hospital, as he had diagnosed perforation of a gastric ulcer. Dr. Lumsden gave me the following history.

* Read before the Royal Academy of Medicine in Ireland.

History.—Mrs. L., aged 40 years, mother of several children, had considered herself in good health until a fortnight ago, although Dr. Lumsden was aware that she suffered from mitral regurgitation for an indefinite period. During the past fortnight she suffered from slight diarrhoea and from occasional pain in the upper abdomen with vomiting after meals; there had been no blood in the vomited matter. On November 3rd, at 3 P.M., she was suddenly seized with acute pain in the epigastrium and left iliac region, which lasted about four hours. This pain followed on an attack of vomiting. On November 4th and 5th she felt better, except for diarrhoea; and on November 6th and 7th she attended to some household duties. On November 8th she arose as usual, and while standing cutting bread at 9 A.M. she was seized with acute pain in the epigastrium, and became weak and went to bed. She took some brandy, which made her feel stronger, but the abdominal pain became much worse and more uniform. At 3 P.M. Dr. Lumsden was sent for, and immediately recognising her condition had her removed to hospital.

Condition when First Seen.—When I saw her with Dr. Lumsden her condition was as follows. She was a fairly strongly-built woman. Her face had a peculiar anxious, drawn, and dusky appearance. Temperature 98.4°, pulse 104, respirations 20. Urine acid, and contained no albumen. There were no signs of intrathoracic disease, except a slight mitral regurgitant bruit. The tongue was coated but moist. The abdomen was distended, rigid, and moved very little on respiration. The chief rigidity and tenderness on pressure was over the left lumbar and iliac regions and epigastrium. On percussion there was comparative dullness in the flanks and uniform tympany in front, and only a very narrow line of liver dullness. I agreed with Dr. Lumsden as to the diagnosis of perforative peritonitis, but was not as confident as he was as to its gastric origin. We of course advised immediate operation, and before 8 P.M. I opened the abdomen, that is eleven hours after the last acute attack of pain.

Operation.—I elected to begin with a 3-inch incision between the umbilicus and pubes, and immediately a rush of gas and dirty yellow fluid containing a quantity of thick purulent-looking matter, having a peculiar nauseating smell, escaped from the peritoneal cavity, and distended and intensely injected coils of small intestine bulged into the wound. The left hand was now passed into the abdominal cavity, and the tubes and appendix were examined, and, being found healthy, the hand and wrist were thrust upwards to guard the intestines whilst the abdominal wall was slit with strong scissors to within a short distance of the ensiform cartilage. I now had no difficulty in finding a perforation as large as a threepenny-piece on the anterior wall of the stomach, very close to the lesser curvature, and high up just where the oesophagus enters. The stomach wall for about half an inch around the perforation was indurated and friable. The remainder of the operation was done as I will describe later on, except the closure of the abdominal incision, which in this case was effected by sutures in layers with silk sutures. The completed operation—that is, dressings, etc., applied—lasted fifty-five minutes.

After-History.—The case after operation ran an uneventful course, and feeding by the mouth was begun on the fourth day, as the rectum was becoming irritable. On the seventh day the patient seemed very well, the temperature, etc., having been practically normal up to this date, but on the morning of the eighth day the temperature ran up to 102°, pulse 140, respirations 32, and I determined to look at the wound. On removing the dressings, I found that the upper part of the wound had become septic, and, fearing deeper complications, I removed the stitches and re-opened the wound as far as the umbilicus, but found that the peritoneal cavity was firmly sealed off by adhesions, so, having removed the buried silk sutures, I plugged the wound, hoping that it would heal by granulation. Next day the patient seemed much better, but on the evening of the tenth day the temperature again was 102°, pulse 140, respirations 32, and we now discovered that she had developed pneumonia of the right base, and, despite all we could do, she died the next evening, having died eleven days after the operation.

Post-mortem Examination.—Septic pneumonia of the right base, hypostatic left base, mitral valves showed old vegetations. In the abdomen the peritoneal cavity was perfectly closed off from the abdominal incision by adhesions, and there was not a trace of pus or any fluid or sign of peritonitis, the intestines, etc., showing normal-looking, shiny peritoneum. The lesser sac was normal. At the upper angle of the open wound, to the right of the falciform ligament, was a small collection of less than a drachm of pus, but this was connected with the open wound, and was not put up in any way. The stomach was removed, and the perforation was found firmly closed. Opposite the site of the perforated ulcer was another ulcer on the posterior wall, evidently produced by contact. Both ulcers were of the round, "punched-out," or "acute" variety.

CASE II.

History.—K. B., aged 23 years, servant girl, had suffered from anæmia and dysmenorrhœa for some months, and for some weeks from vague pain and uneasiness in the stomach, with occasional vomiting. On December 9th, 1899, she was sweeping a room, when she suddenly felt great pain in the abdomen, and became faint. Her illness was supposed to be due to the onset of menstruation, which was a week overdue, and that evening she was treated by hot hip baths. Next day peritonitis was recognised, and she was treated by opium stupes, opium by the mouth, and fluid diet.

Condition when First Seen.—On December 10th, at 10 P.M. (thirty hours after onset of her illness) I was asked by my colleague, Dr. Ledwich, to see the case with him in hospital, as she had meanwhile been transferred to his care in that institution. The temperature was 98.4°, pulse 140, respirations 36, urine 1040: no albumen. She complained of intense pain all over the abdomen. Her face was very drawn and anxious, tongue furred and brownish, but not dry; abdomen very much distended, and uniformly tympanitic in front, with dullness in the flanks; liver dullness was absent. We considered it to be a case of perforated gastric ulcer, and as she was fairly strong in spite of the rapidity of the pulse, and was very anxious to have every chance given to her, I decided to operate, having informed all those concerned what a forlorn hope such a procedure must be.

Operation.—The abdomen was opened at 11 P.M., just thirty-one hours after perforation. The incision used was one between the ensiform cartilage and umbilicus, with a transverse cut through the left rectus. The perforation was easily found, and was in the same position and of the same character as in the first case. The operation lasted one hour.

Death.—The patient rallied fairly from the anæsthetic, but died suddenly three hours after the operation.

Post-mortem Examination.—Single ulcer of "acute" variety. The lesser sac of the peritoneum was normal.

CASE III.

E. P., aged 32, drayman, had been attending Guinness's Dispensary for some time, where he was treated by my colleague, Dr. Lumsden, to whom I am indebted for the following history.

History.—The patient, who is a tall, bony-looking man, had been complaining of pain in the region of the stomach for several weeks, and periodical vomiting of large quantities of fluid and undigested food. The pain was not connected with meals, and the vomiting only occurred every second or third day, and the vomit contained no blood. The patient had wasted very much during the last two months. On examination a dilated stomach was found, and treatment was instituted for its relief. On April 18th, 1900, the patient presented himself at the dispensary with the same signs as before, and in addition great tenderness in the epigastric region, and rigidity of the recti. He was ordered to lie up and be attended at his home. At 10.30 P.M. Dr. Lumsden was sent for, and found that he had partaken of some fluid food at 2 P.M., and from that until 10 P.M. vomited occasionally. At 10 P.M. he took a drink of cold water, and felt a sudden pain in the epigastrium. Dr. Lumsden found him rather collapsed, with hands and feet cold and face anxious looking, his pulse 78, temperature normal, the abdomen rigid, and liver dullness decreased but not lost. A hypodermic injection of morphine was administered, and instructions left to send for help if the pain did not abate. Next morning, April 19th, Dr. Lumsden and his colleague, Dr. Copley, saw the patient, and the only change in his condition was that the abdomen was more rigid, so they had him conveyed to hospital.

Condition when First Seen.—I saw him in consultation with Dr. Lumsden and the other members of the staff and Dr. Copley, and found his condition as follows: Temperature 98.6°, pulse 100, respirations somewhat quickened (actual frequency not recorded), face drawn and anxious, tongue covered with a brown fur, and he complained of great pain in the epigastrium and over the abdomen generally. The abdomen was not markedly distended, and seemed fuller in the left hypochondriac region than elsewhere. On palpation the muscles were rigid, and pain was elicited chiefly in the epigastrium. On percussion there was relative dullness in the flanks, the front of the abdomen was tympanitic, except in the epigastrium, which was dull, but the tympany was not uniform, and a dilated stomach could be mapped out and succussion elicited by careful manipulation. The liver dullness was much decreased. The opinion of the consultants and of the patient himself was that palliative measures should be tried, and another consultation held in the afternoon.

Operation.—At the second consultation we found that the patient had vomited dark "peritonitic" vomit in considerable quantity, the epigastric dullness was gone, the abdomen was more distended and the tympany more uniform, so he was removed to the theatre, and I opened his abdomen at 5 P.M. (nineteen hours after perforation). The diagnosis made before operation was stricture of the pylorus complicated by perforated gastric ulcer. The incision used was the same as in the last case, except that the transverse incision divided the right rectus. The perforation (of large size) was easily found within an inch of the pylorus. The pylorus was firmly bound down and thickened, and on digital examination through the enlarged perforation was found tightly strstricted. A longitudinal incision was made from the perforation through the stricture, and both ailments treated at the same time by performing a pyloroplasty. The operation was very difficult as the pylorus could not be brought up to the wound. The line of suture was reinforced by an omental graft, and the operation completed as in the other cases. The completed operation lasted one hour and twenty minutes.

Death.—This patient did well for a few days, but then black vomit returned and severe diarrhoea, and he died five days after the operation.

Post-mortem Examination.—Abdominal incision healed, and apparently aseptic. No fluid of any sort in the peritoneal cavity, but the peritoneum was sticky, and injected, showing peritonitis. The lesser sac was normal. The pyloroplasty was perfectly sound, and two fingers could be passed through the pylorus. The stomach was large, thickened, and contained three other ulcers, two on the posterior wall and one on the anterior. They were all of the "acute" variety.

CASE IV.

History.—W. N., aged 20, porter, had always been thin and delicate, and never had any appetite for breakfast. During the last six weeks he had felt slight constant pain in the region of the stomach, and he had an attack of vomiting four days ago. On April 26th, 1900, he went to work as usual, and at 10.30 A.M., during some exertion, he felt a sudden pain in the upper part of the abdomen, and he came to hospital. He was admitted, but it was not considered necessary to send for the physician on duty until the evening, when the boy seemed worse. Dr. Lumsden then saw him, and sent for me in consultation at 8 P.M.

Condition when First Seen.—Temperature 98°, pulse 84, respirations 34. Tongue furred but moist, short cough, no vomiting, bowels moved during the day. His face looked very distressed and pinched. He complained of great pain in the epigastrium, and the abdomen was very rigid, especially in the upper part, and moved very little on respiration. On percussion there was relative dullness in the flanks, and liver dullness was absent. There was nothing abnormal to be found in the chest.

Operation.—We diagnosed perforation of a gastric ulcer, and I opened his abdomen at 11 P.M. (12½ hours after perforation). The incision was the same as in Case III, and a perforation the size of a quill was found near the pylorus. The operation was finished like the others, and lasted one hour and ten minutes.

After-History.—On the fourth day after operation he showed signs of a localised patch of pneumonia at the upper part of the right lower lobe, and the temperature and pulse rose. On the ninth day the stitches were removed, and the abdominal wound was found healed. The chest was explored with a negative result. On the fourteenth day there were signs of a cavity in the lung, and the sputum was abundant and contained elastic tissue and septic organisms, but no tubercle bacilli. From this

date he rapidly improved, and was allowed up a month after the operation, and is to-day in better health than he ever was before, and has no signs of anything abnormal in either chest or abdomen.

Four cases are not enough to draw deductions from in ordinary ailments, but considering the comparative rarity of this one, I hope you will excuse me if I appear in anything too dogmatic even when I join my small practical experience with material from current literature.

DIAGNOSIS.

The first thing which concerns us is diagnosis, and the first practical point I have learned is to regard with extreme suspicion the diagnosis of gastric ulcer and perforation as given in the standard textbooks. The previous history we may expect to get from these patients would hardly satisfy physicians of a few years ago that even gastralgia was present; however there is always some symptom pointing in an indefinite manner to a gastric source.

The onset of perforation is sudden, and frequently takes place during some exertion. In some cases we may get a double onset, as in Cases I and III, which I consider to have been cases of localised extravasation with subsequent diffusion. The onset is severe, but need not incapacitate the sufferer as in Case IV, who could walk to hospital. The onset is frequently preceded by vomiting, but not often followed by it. Pain is referred to the epigastrium, but may soon spread to the left or right iliac region; this is not a metastasis but an extension. The bowels may be either constipated or there may be diarrhoea. There is generally no difficulty or pain during micturition.

The amount of collapse is variable, but often not marked, and tends to pass off to a great extent within a few hours. Thirst is not intense until late.

The face is anxious and pinched and the manner restless, but there is no sweating or tossing about. Respiration is frequent and shallow, the abdominal respiration being abolished or very greatly diminished. The abdomen is flat in men or and in nulliparous females, but distended in those who have borne children or who are relaxed from other causes. The tongue is coated with a white or yellowish fur, and is moist. The temperature is subnormal or normal, and the pulse in many cases is remarkably infrequent, in others may be frequent.

The apex beat is displaced upwards and the abdominal muscles are rigid. Pain is complained of on pressure over the upper abdomen. If respiration is stopped pressure can be continued, but as soon as respiration starts again pain is intense, and a friction fremitus may be felt.

Tympany is uniform except in some cases over the stomach, which may retain its peculiar note. Liver dulness is absent or rapidly diminishes. Dulness in the flanks is only a late sign. In abdomens which do not appear distended the abdominal note will encroach unduly and in some cases very excessively on the thoracic area.

The points I wish to draw special attention to are: (1) The pain, which begins in the epigastrium, spreads, but does not shift its position. (2) There is no pain on micturition, which is a frequent sign in peritonitis of the lower abdomen. (3) Thirst is not intense, and there is no flinging about, as in hæmorrhage. (4) There may be no distension in muscular subjects, the tympanites and free gas being only shown by the encroachment on the thoracic area. (5) The pulse cannot be relied upon in forming an early diagnosis. (6) The statement sometimes made that a "stomach note" excludes perforation is unwarrantable, as a perforated and a collapsed stomach are by no means synonymous terms. (7) Liver dulness is diminished or absent in almost every case.

INDICATIONS FOR OPERATION.

Having made a diagnosis, there is only one treatment—namely, to open the abdomen, and perform certain other manipulations suitable to each case. But we are likely to be asked what cases should be operated upon² and at what period should they be operated upon?

The answer to the first question is that every case in which the diagnosis has been made in time should be operated upon, and, further, that every case in which the condition is strongly suspected should be submitted to an exploratory operation, by which I mean an operation undertaken in a case in which it is impossible to give a definite name to the pri-

mary disease, but in which such secondary signs are present as by analogy would lead us to expect a fatal termination if not treated by operation.

The answer to the second question naturally divides itself into two—namely, (1) the best time is as soon after the diagnosis as an operation can be methodically undertaken; (2) it is never too late, unless the patient is evidently moribund. This latter statement can be easily proved by anybody who takes the trouble to read a few of the cases recorded from time to time.

METHOD OF OPERATION.

With regard to the operation, the primary incision is best made in the ordinary way midway between the umbilicus and ensiform cartilage, and this should be enlarged in any direction in which more room is required, either longitudinally or transversely, by cutting with strong scissors. The perforation in over 80 per cent. of the cases will communicate with the greater sac of peritoneum, and can be readily found. If the anterior surface shows no perforation, then the posterior surface can be exposed by tearing through the gastro-colic omentum, thus opening the lesser sac.

The next thing is to empty the stomach through the perforation by means of a catheter, and then sew up the opening. Some advise excision of the ulcer, but most operators prefer simple suture. The form of suture I used in my cases was a through-and-through, interrupted silk stitch, covered in by a continuous silk stitch usually called Dupuytren's, and over all an omental graft, which adds very little to the time of operation.

The most important part of the operation is the cleansing of the peritoneal cavity; some recommend douching, others sponging. I think that in every localised peritonitis sponging with gauze pads is the best; but where the soiling and peritonitis are general sponging does not appeal to me. On the other hand douching, no matter how prolonged, will not remove the tenacious purulent lymph from the pelvis and subphrenic regions.

I think the right course is to douche, then to carefully wipe out the pelvis, superior surface of the liver and inferior surface of the diaphragm with large gauze pads held in the hand, not in forceps, and then again a final douching. The best way to do the first douching is to hold up the edges of the wound and pour in saline solution from a jug, gently manipulating the intestines, etc., until all gross material ceases to come away.

For the final and more methodical douching the best plan is to take the end of a wide rubber douche tube in the hand, without any nozzle, and passing the hand and forearm through the wound, carry it into the pelvis and douche upwards, and then carry it above the liver on both sides, finally removing as much as possible of the fluid.

With regard to the debated point as to whether we should open the lesser sac in every case, all I can say is that in none of my cases did I do so, and in none of them did subsequent events prove that I was wrong. It is of far more importance in every case, no matter how localised it appears, to carefully pass the hand down into the pelvis and up over the liver, and make certain that these treacherous regions are clean.

Drainage is employed by some and not by others, and my view is that abdominal drainage is futile except in cases in which there is a distinct abscess cavity walled off by adhesions, and my two cases which died without drainage showed at the *post-mortem* examination that drainage was not required, and would not have brought about any happier result.

There is one very practical point worth noting in the closure of the abdomen, and that is to use through-and-through fishing-gut sutures, as they exert no capillary action between the non-aseptic peritoneal cavity and the wound, and the two cases in which I used this method proved its usefulness. In my first case I used permanent silk sutures, and to the subsequent infection of them I attribute the death of this patient, who died cured of her ulcer and peritonitis, but subsequently infected from the suppurating abdominal incision.

NOTE.

² The apparent delay in opening the abdomen in this case and in Case IV was due to the patients wishing to see their relatives before operation, and thus much precious time was lost.