INTESTINAL PERFORATION IN TYPHOID FEVER; ITS DIAGNOSIS AND SURGICAL TREATMENT.

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If it were necessary that one should make an apology for offering a contribution on this subject, I should say that it has been twenty-three years since Leyden first proposed the surgical treatment of this malady and Mikulicz did the first successful operation, giving to humanity the first ray of hope in a contest where death was well nigh inevitable. A year and a half ago I lost my own son from this accident. Had I made as careful a study of the diagnosis of perforation in typhoid before his illness as I have made since, I think his life might have been saved.

And so I feel somewhat like the rich man, the story of whom is told in sacred history, who, languishing in eternal punishment, looked up to Lazarus in the bosom of Abraham and implored him, if he could not come to him and ease his suffering with a cup of water, to go back to earth and warn his brothers so that his fate might not be theirs.

The scope of this paper includes a brief history of

Fig. 1.—Large ulcer with small perforation and numerous small ulcers penetrating mucous coat. Typhoid fever, third week; perforation, fatal peritonitis (from specimen in U. S. Army Medical Museum, Washington, D. C.). Dr. W. C. Miner, acting assistant surgeon, U. S. Army.

the surgical treatment of intestinal perforation in typhoid fever: the presentation of some of the statistics of Keen collaborated by Wescott, Tinker, Harte and Ashhurst, of all cases operated on up to 1903; a brief analysis of the statistics of all the cases operated on from January, 1903, up to January, 1907; the diagnosis and treatment of intestinal perforation in typhoid, and, lastly, the report of my own case.

The statistics of the early operation for this accident were so discouraging that for many years little progress was made. The early statistics of Keen give a mortality of over 80 per cent. Harte and Ashhurst report the total number of patients operated on, up to January, 1903, as 362, with a mortality of 74.03 per cent. I have collected so far as possible the cases of patients operated on from January, 1903, to January, 1907, a total of 162, with a mortality of 62.34 per cent. It will be observed by these statistics that in the last four years

there has been a fall in the mortality rate from 74.03 per cent. to 62.34 per cent.

These statistics are what might be expected, resulting no doubt from the fact that we are becoming more vigilant in our efforts to detect perforation at the time of its occurrence and in procuring for our patients an early operation.

The ileum is the seat of perforation in about 95 per cent. of the cases, and the perforation when in the ileum, in a majority of the cases, is within 18 inches of the cecum. Occasionally it is found as far as three feet from this locality.

The different forms of perforations are well represented in Figures 1 to 5.

DIAGNOSIS.

In the clear-minded cases where the onset is sudden, a diagnosis can be made with tolerable certainty. In the cases where stupor is pronounced and we are obliged to rely almost wholly on our own observation and on physical examination, the diagnosis is very difficult, sometimes

Fig. 2.—Large perforation: typhoid fever, fifth week; perforation; fatal peritonitis; soldier, aged 24, was convalescing (from specimen in U. S. Army Medical Museum, Washington, D. C.). Dr. Ely McClellan, surgeon, U. S. Army.

impossible. But in every case where the conditions indicate the probability of a perforation, we are justified in making an exploratory incision and by inspection establish a diagnosis. A long step in advance will be made when we fully realize the importance of an attempt in our diagnoses of differentiating between the symptoms of perforation and those of advancing septic peritonitis.

It is undoubtedly true that an ulcer in a Peyer's patch or solitary gland may extend to the peritoneal intestinal coat without perforating it, giving symptoms of perforation and local peritonitis; yet to make such a diagnosis and to depend on Nature to form about this spot a wall of adhesions to prevent perforation or general peritoneal infection, is as unscientific and unsurgical as to depend on Nature to perform the same office in appendicitis.

The symptoms most frequently observed after perfor-

* Read in the Section on Surgery and Anatomy of the American Medical Association, at the Fifty-eighth Annual Session, June, 1907. This is an abstract; the full paper, including the bibliography, will appear in the Transactions of the Section and in the author's reprints.

ation are: Pain in the abdomen, rigidity of the abdominal muscles, tenderness, increase of pulse rate and rise of temperature, nausea, chill, tympany, disappearance of liver dulness, movable dulness in the flank and a facies characteristic of shock and sepsis. According to Murphy, the symptoms of perforation are "sudden and severe pain, nausea and often vomiting, local hypersensitiveness and absence of peristalsis in the painful area."

Of all the symptoms, pain is the one most constantly present, and therefore most reliable. Yet pain may be present in other conditions in typhoid, notably in thrombosis of the iliac veins. In a series of 500 cases of typhoid observed by McCrae, pain was a symptom in 161 cases. In these cases the pain was due to perforation in 13, to hemorrhage in 13, and to other known causes in 65, but in 70 cases the cause could not be explained. In the author's case the pain appeared suddenly in the lower abdomen, causing the patient to cry out. Soon after the occurrence of abdominal pain there was an intense pain in the penis.

Hayes says: "The diagnosis of perforation is usually easy. The symptoms are so characteristic that even when the patient is a foreigner or is delirious, the diag-

Fig. 3.—Ulcer and small perforation; typhoid fever, probably third week; perforation of ileum and fatal peritonitis (from specimen in U. S. Army Medical Museum, Washington, D. C.). Dr. Rupert Norton, acting assistant surgeon, U. S. Army.

nosis can be made just as well. The three cardinal symptoms are, however, the sudden pain, rigidity, the tenderness of the abdomen to pressure. These three symptoms being present in any case of typhoid fever, operation is indicated and demanded."

Some writers report a fall of the pulse rate immediately after the perforation. A much more uniform condition is a marked increase in the pulse rate an hour or two after the first symptoms of perforation. In the author's case the pulse at 9:45 a. m., just previous to the time of perforation, was 98, temperature 100.6 F. One hour later, the pulse was 100, temperature 101.3 F. The pulse and temperature continued to rise for seven hours, at which time they were 108 and 105.4 F., respectively. Tenderness usually accompanies rigidity.

Regarding the leucocyte count, we must say that most authorities do not attach much importance to it as an aid to diagnosis in perforation. Cushing makes an important observation regarding this question. He says:

"An individual observation at such a critical time may be misleading, in the first place, because a condition of hypoleucocytosis often is a characteristic of the fever and a count apparently within normal limits of 8,000 to 10,000 may actually represent a double increase in the number, and secondly, because by a single count the transient 'wave of leucocytosis' may entirely escape notice." It must be considered confirmatory of other symptoms rather than a positive indication for surgical intervention.

TREATMENT.

In the light of late experience the treatment of intestinal perforation in typhoid is unquestionably limited to surgical procedure.

TECHNIC OF OPERATION.

The right lateral incision is the one almost invariably selected for the operation. The appendix and cecum should be examined, and if the perforation is not located in these organs, the ileum should next be examined and then the colon. According to Keen, in ten cases of perforation of the colon, five were in the sigmoid flexure. This writer adds: "If therefore no perforation is found in the ileum, cecum or appendix, the next most

Fig. 4.—Large perforation and two small perforations; typhoid fever, third week; perforation, fatal peritonitis (from specimen in U. S. Army Medical Museum, Washington, D. C.). Dr. W. H. Forwood, surgeon, U. S. Army.

likely place is the sigmoid flexure." The perforation may be closed in several tiers with the interrupted or continuous Lembert, purse-string or the mattress suture. Silk or cotton should always be used.

The last three feet of the ileum should be examined for other perforations or for thinned ulcerated surfaces threatening perforation, and such surfaces inverted by suture in the same way as for perforation.

As to the best method of dealing with the extravasated material in the peritoneal cavity, there is considerable diversity of opinion. Some employ extensive flushing of the cavity with physiologic saline solution until the fluid flows away clear; others recommend thorough cleaning away of this material by dry sponging; a few decry any attempt to remove the pus and intestinal extravasations as a useless waste of time, endangering to a greater degree the patient's chances for recovery.

In a vast majority of these cases, we are dealing simply with a general septic peritonitis in typhoid which

differs in no essential particular from the treatment of the same condition in perforating gastric or duodenal ulcer, perforation of the intestine from any cause of perforating appendicitis. The most rational procedure it seems to me has been evolved by Dr. J. B. Murphy for the treatment of general septic peritonitis, which embraces the following principles:

1. Rapid execution with the smallest amount of work possible in the abdominal cavity consistent with the exigencies of the case.
2. The avoidance of every procedure calculated to favor the extension of infection or absorption of bacteria, such as mopping away debris and lymph deposits on the intestines and flushing the abdominal cavity.
3. The providing for thorough drainage by rubber tubes and posture (Fowler's position).
4. The elimination of toxins.

Having disposed of the intestinal perforation and drainage tubes, I think we should not stand longer on ceremony, but get out. The lymph deposits from the intestines should not be mopped off, nor the abdominal cavity flushed out in any case. The first procedure is positively harmful, and the latter an unnecessary waste of time and probably more likely to spread infection than to limit or eliminate it.

It is not the perforation that causes the most profound symptoms we observe in septic peritonitis. These symp-

in the Fowler's position and avoid irrigation which tends to promote absorption of bacteria. After closing the perforation, drainage is procured by placing several good-sized drainage tubes deep into the pelvis.

Elimination is encouraged by proctoclysis in the following manner: A fountain syringe containing one and a half pints of warm physiologic saline solution is hung at such a height that the fluid by force of gravity will issue from the tube by constant dropping or in a very small stream when the tube is passed into the rectum. The flow must be controlled wholly by gravity and the elevation will depend on the degree of abdominal tension which will vary in each case (Murphy).

If the flow of the saline solution is controlled entirely by gravity, the intestinal gases will pass out through the tube and be expelled through the solution in the syringe. If straining occurs the fluid in the rectum will be forced back into the syringe and not into the bed and will return again to the rectum. The administration of salt solution should be repeated every two hours for a period of three or four days.

Dr. Murphy says: "I have given as high as 30 pints in twenty-four hours to a child 12 years old. In the last, my forty-first, case of perforative peritonitis, we gave 18 pints of salt solution each twenty-four hours for eleven days, and none of it was expelled into the bed."

Keeping the patient in the correct Fowler position by the ordinary shoulder rest and bolstering up with pil-

Fig. 5.—Multiple perforation in large ulcerated surfaces; typhoid fever, third week; perforation; fatal peritonitis (specimen from U. S. Army Medical Museum, Washington, D. C.). Dr. H. M. Dean, acting assistant surgeon, U. S. Army.

toms come on some hours after perforation, when the intestine has become denuded of its endothelium, so that there is rapid absorption of bacteria and of septic material.

In this connection the experiments on animals by Dr. B. H. Buxton on the processes of absorption in the peritoneal cavity are of intense interest. These experiments prove that if micro-organisms, like the typhoid or colon bacillus, are introduced into the peritoneal cavity, they soon appear in the blood, being absorbed almost wholly through the lymphatics of the diaphragm. Absorption of bacteria occurs but little, or not at all through the parietal, visceral or mesenteric peritoneum. Flushing of the abdominal cavity, therefore, carries the bacteria toward the diaphragm, where they are readily absorbed.

The profound toxic effects do not appear, however, for about two hours, at the end of which time the bacteria are destroyed and through this process of disintegration liberate their "endotoxins" in the blood. We have, therefore, instead of shock an overwhelming of the system by intercellular toxins.

In treating the peritoneal conditions present in typhoid perforation, therefore, we should place the patient

Fig. 6.—Double inclined plane, shoulder and leg rest for Fowler's position; patient in position.

lows is a very difficult, and it seems to me, impossible thing to do. There is a constant tendency, especially in weak individuals, to slide down into the bed. Many times when the patient appears to be in good position an examination will prove that it is a deception. The shoulders will be well up on the rest, but the body will be found bent at the costal arch and the abdomen will be on a plane parallel with the surface of the mattress. To obviate this, I have had constructed a simple device¹ which seems to keep the patient in this position without constant vigilance on the part of the attendant (Fig. 6).

TIME OF OPERATION.

The late experience of surgeons is that in those cases in which the patients are operated on after the first twenty-four hours, a majority die, while of those patients operated on within the first eight hours, a majority live. Of 162 patients operated on since 1903, whose history I have collected, the time of operation is

1. While talking with Dr. James M. Neff, of Chicago, about some device to maintain the patient in the Fowler position he suggested that an apparatus constructed on the principle of the double-inclined plane would be ideal. Acting on this suggestion I had manufactured by the Weyburn Company, Rockford, Ill., this shoulder-rest, with double inclined-plane extension.

known in 81. Those operated on within the first eight hours had a recovery rate of 54.54 per cent.

The treatment may thus be epitomized:

1. Lateral incision through right rectus or linea semilunaris as for appendectomy.
2. Systematic search for, and suture of, the perforation.
3. Placing of drainage tubes.
4. Partial closure of wound without irrigation or mopping in the peritoneal cavity.
5. Treatment by posture to confine bacteria and septic material to lower abdomen (Fowler's position).
6. Treatment calculated to destroy or impede the growth of bacteria already in the blood and tissues: Antistreptococcic serum, unguentum Crédé.
7. Supportive treatment: Nourishment, strychnin and digitalin hypodermatically.
8. Elimination: Physiologic salt subdermally (temporarily) when indicated for failing heart; proctocylis continually, until sepsis is overcome.

REPORT OF CASE.

The case I report is that of my own son, and is remarkable in that three laparotomies were performed during a run of typhoid fever of fifty-one days. This is the third or fourth case reported in medical literature, I believe, where more than one laparotomy has been performed for intestinal perforation and its sequels in typhoid fever.

History.—Ernest S. A., male, aged 17. The illness began without prodromal symptoms, Sept. 27, 1905. The first symptom was a severe chill; an hour later the temperature was 103 F.; slight epistaxis during first week; on the thirteenth day a slight intestinal hemorrhage occurred. Two days later, after an enema was given, the patient was seized with a pain in the lower abdomen, causing him to cry out; at the same time he complained of an intense pain in the penis. Perforation was suspected and consultation held. Operation deferred. Previous to these symptoms the pulse was 98, temperature 100.6 F. Seven hours later the pulse was 108, temperature 105.4 F.

First Operation.—Operation Oct. 5, 1905, by Dr. Murphy's associate, Dr. James M. Neff, thirty-seven hours after perforation. A perforation the size of a lead pencil was found in the ileum, 12 inches above the cecum. Perforation repaired, drainage without sponging or irrigation in the peritoneal cavity. The patient recovered from this operation. A fecal fistula developed at the site of the drainage tube about a week later.

Second Operation.—Nineteen days later, October 27, a second operation was performed by Dr. Neff for suspected pus pocket. A few adhesions among the intestines were broken up, but pus pocket was not located. Wound closed with rubber drain. Patient rallied from the operation well and gradually improved. Most of the bowel movement passed through the fistula at this time. On November 10 the record shows the patient had had ten days' normal temperature. During the forenoon of this date he suffered from a sudden pain in the upper abdomen. Some distension in this region and discharge from fistula greatly diminished. Intestinal obstruction feared.

Third Operation.—On November 11 an operation for intestinal obstruction was performed by Dr. Neff. Incision through left rectus above umbilicus. Operation revealed a kinking of the small intestine caused by a fibrous band. Obstruction relieved immediately by dividing the band. Patient died eight hours later.

Autopsy.—A partial autopsy was made of the abdominal viscera. The fecal fistula was at the site of the perforation in the ileum, the stitches having given way, allowing a reopening of the perforation. Deep in the left pelvis circumscribed by exudate and adherent coils of intestines, an abscess was found containing from four to six ounces of very offensive pus.

DISCUSSION OF CASE.

It is evident that from the beginning the case was one of virulent typhoid infection. This is indicated by the sudden onset of the fever following a severe chill, which was the first symptom of illness. Had the patient been operated on within a few hours after the perforation was suspected, I believe there might have been a favorable termination. An early operation would have greatly limited septic peritonitis, which caused intestinal obstruction from adhesions.

There is one feature in the case about which I have not spoken. There was a perforation in the cecum which was plainly visible as this organ lay in the lower angle of the partially closed wound made at the first operation. There was no fecal discharge through it, although the semi-solid feces could be seen plugging the opening.

Had the case progressed favorably, it is not at all likely that this perforation would have caused any trouble. It probably would have healed spontaneously. If it had discharged the contained feces, it would have been received outside of the peritoneal cavity. The intestinal obstruction should have received earlier surgical attention. Yet one may be pardoned for hesitating about entering the peritoneal cavity the third time in the course of typhoid fever.

The question of the ultimate termination of the deep pelvic abscess, had life continued, is a more difficult one to decide. I am convinced that this was not a pus-pocket resulting from septic peritonitis, but an independent focus of typhoid infection having its origin in a mesenteric gland. It was not confined by the coils of intestines, but by a thick wall of exudate in the mesentery region. In its location, it was evidently doing no harm, being hemmed in by a protective wall of exudate, and possibly the contained micro-organisms had lost their virulency. It might have been safely discharged through one of the abdominal wounds.

In spite of the late operation for perforation, the septic peritonitis had been entirely overcome, for the patient had subsequently ten days of practically normal temperature. The management of the case after operation was that described in the text of this paper under treatment.

If I have succeeded in any degree in awakening an interest in this subject, that its importance deserves. I shall feel that my boy has not lived and died in vain.

DISCUSSION.

DR. JOHN B. MURPHY, Chicago, emphasized the time of operation. Can one save the patient with typhoid perforation? Yes, if operated on in time. No, if one waits until such time as the patient is in a condition that contraindicates operation. All of the symptoms indicating operation were, he said, clearly and concisely stated by Dr. Allaben; namely, the pain, the local hypersensitiveness, the nausea, the vomiting, the elevation of temperature above that which the patient had before, and, finally, the hyperleucocytosis. In a recent epidemic of typhoid in Chicago, the hyperleucocytosis was absent in a considerable number of the cases, while the other symptoms were present almost invariably, and in the order mentioned. The question of collapse, Dr. Murphy said, is the most important one and the most difficult one to eradicate from the average practitioner's mind. Collapse has so long been recognized as indicative of perforation in the peritoneal cavity that it is difficult to persuade ourselves that collapse is not an evidence of perforation into the peritoneal cavity, but of absorption of an excessive quantity of sepsis produced by the perforation into the peritoneal cavity. By waiting for collapse as a symptom indicative of perforation, one will miss the only time when it is possible to rescue the patient from

the complication of his typhoid. As to the diagnosis: Dr. Murphy stated that the diagnosis can be made and should be made timely, by observing the symptoms present. Then, the diagnosis made, action should be forceful and prompt. All surgeons, he said, regret the time when so much was done in the peritoneal cavity in cases of perforation. Since then it has been found that disturbance of the peritoneal surface is a detriment. Surgeons have learned, furthermore, from the most excellent experiments made recently, that the fluid which Nature throws out into the peritoneal cavity, and which is considered to be pus, is often a prophylactic fluid that saves the patient's life. It is known, however, practically, whether the theory is right or wrong, that if that fluid is permitted to remain, as a rule, the resistance in these cases is sufficiently great to save the life of the patient, with the assistance of drainage and with the further assistance of a closure of the perforation. It is not sufficient to drain the peritoneal cavity in the presence of perforation of any kind, and this is shown most strikingly in connection with perforation from the duodenum, the most favorable place of perforation as far as septic peritonitis is concerned. It was found that in nineteen consecutive cases of perforation of the duodenum in which only drainage was instituted, eighteen patients died immediately and the remaining patient died four or six weeks afterward. This is particularly true where the opening in the alimentary canal is low down, where the sepsis of the intestinal contents is greater than in the duodenum, and that is an indication that one should, in this operation, always close the opening.

The details of the after-treatment Dr. Murphy referred to briefly in connection with one statement made by Dr. Allaben. He gave the details of the after-treatment as carried out by Dr. Murphy in four typhoid perforations and in forty-one consecutive cases of general suppurative peritonitis from perforation of the alimentary tract. In these forty-one cases there were forty cures and one death. These details are important, tiding the patient over the acute hour of sepsis, which is immediately after operation, by washing out the blood by means of a large quantity of fluid administered by internal clisis. The method of taking it is the most difficult of all things in surgery, to impress on the average nurse or on the average man the manner of using it. It must be admitted by pressure alone, and through a tube that will let the water flow in and out, and the hydraulic pressure must just exceed the abdominal pressure. It must not be done by placing the container seven or ten feet above the patient, with a forceps attached to the tube letting the water drop down. It must flow freely in and out, and when given in that way, the fluid is rarely rejected. In the operative treatment, Dr. Murphy said, it is very important to do as little work as possible. Open the abdomen, find the opening and close it. He emphasized the importance Dr. Allaben laid on searching the large intestine for an opening. One should not go out of the abdominal cavity in a perforative case until the opening is closed, or the time will be wasted and the patient will be lost.

DR. L. J. HAMMOND, Philadelphia, expressed his belief that it is in the prophylaxis of perforative peritonitis that the hope of lowering the mortality lies. Following out this line of thought, he has during the past three years endeavored to learn the condition of the abdominal viscera of subjects dying from typhoid fever from causes other than perforative peritonitis, and in no instance has he, either from postmortem findings or from histories and hospital records of cases been satisfied that a single case of perforation took place in a subject whose bowels were free from adhesions. He further demonstrated, to his own satisfaction at least, that in every instance of perforation there was pronounced evidence of pre-existing disease of the intestines, which was shown by the presence of adhesions more or less extensive, and more often found to be the result of present or past appendicitis, though in some instances other of the abdominal viscera had been the cause of these adhesions, especially those found about the hepatic, gastric and splenic flexures. From these observations, Dr. Hammond was led to the conclusion that it is extremely doubtful whether perforation ever takes place from

typhoid fever in subjects whose intestines are free from adhesions. He thought that Dr. Allaben's case confirmed this belief. It seems self-evident, he said, that a bowel anchored by adhesions would suffer perforation where an ulcerative process attacked the glands in its mucous surface, and where it is still further helped along by a general impairment of tissue resistance, as occurs in this grave disease. If this position is correct, there is every reason to believe that a very decided lessening of mortality can result from prophylactic treatment. Clinicians claim that during the early stage of typhoid fever, that is, up to the seventh or ninth day, there should be no abdominal symptoms; that is, the abdominal symptoms do not appear until the bacillus has become deposited in the Peyer's patches. Given a case, therefore, where in the first week of the disease, abdominal symptoms, especially tenderness with distension, are pronounced, it would seem rational to conclude that pre-existing disease of the intestines existed, and if a reasonably certain diagnosis can be made, an exploratory incision should be justified for the purpose of removing the cause and freeing the intestines of their adhesions, which should enable them the better to withstand the ulcerative process.

The importance of such an operative procedure was most impressively brought to Dr. Hammond's attention in the case of a woman, about 30 years of age, whose intestine perforated during the third week of typhoid. The operation, which was performed a few hours after the diagnosis of perforation had been made, showed the existence of not only a perforation of the ulcer, but a complete rent in the bowel that severed the lumen transverse to its long axis down to its mesenteric attachment and the caput-coli, while several knuckles of the lumen were imbedded in the massive old adhesions from pre-existing appendicitis. In a second case, where a tentative diagnosis of typhoid had been made, the physician was much concerned about the accuracy of his diagnosis because of the continuous and increasing abdominal pain and distension. On the sixth day there could be felt to the right of the hypocondrium a mass, which was decidedly tender on palpation. The patient was very tympanitic. Operation was advised. An incision was made under ether anesthesia on the next day. The appendix was found firmly adherent posteriorly and there was much agglutination of the coils of the ileum on the right side. The appendix was removed, the intestines freed of their adhesions and the patient went through her typhoid fever without complications.

One would naturally expect that such an impairment of bowel function as was present in this case, if it did not actually cause perforation, would certainly contribute much toward its occurring. There is every reason to believe that when adhesions of the intestines exist, the normal function of the bowel is disturbed through interference with the fecal current and alteration in the circulation, both of which should be regarded as distinctly favoring, if not absolutely causing, perforation.

DR. WILLARD BARTLETT, St. Louis, said that in three instances he brought the perforated area to the surface and stitched the intestine to the abdominal wall and left a fecal fistula to form; and two of his patients are well now. One was hopeless at the time of operation. It takes only two minutes to do this, and neither a surgeon nor a hospital is required.

DR. ROBERT T. MORRIS, New York, thought it worth noting that a patient may sometimes recover after perforation of the bowel in typhoid without operation. He has seen one case in which after perforation had occurred, the bowel contents had escaped and had become encapsulated. About six months after the patient had recovered from his typhoid, he operated for angulation and perforation of the bowel at the site of the old adhesions and found this encapsulated fecal mass. Of course, he does not believe in waiting for that sort of thing to occur. He believes that the quickest thing to do is the best—to make a diagnosis early and bring the perforation to the abdominal wall as quickly as possible. Get in and get out. Do it all in two minutes.

DR. W. A. BATCHELOR, Milwaukee, Wis., referred to one case of typhoid perforation which illustrates several points

brought out—the early diagnosis and early operation. This case occurred in the third week. The first symptom to suggest perforation was abdominal pain, occurring about 7 o'clock in the morning. The man was operated on at 3 o'clock of the same day in his house, after very careful preparation of the room and the securing of assistants, nurses, etc. The perforation was found about eight or nine inches from the ileocecal valve, a small round perforation such as would be made by a 22-caliber rifle bullet. After closing the perforation with Lembert sutures, it seemed that the lumen of the gut had been so much encroached on that there was danger of obstruction. Dr. Batchelor cut out the stitches, took out the threads and made a circular purse-string suture, which seemed to close the opening satisfactorily and with a less degree of narrowing of the lumen of the intestine. The man recovered, and in the subsequent treatment Dr. Batchelor made use of the saline solution, something as suggested by Dr. Murphy, but not so much with the idea of washing out the bowel as to bring in nourishment. The saline solution was put in by means of a fountain syringe, and the discharging pipe was clamped off. The solution was admitted drop by drop and was used constantly. It seemed to take the place of nourishment and of drink and worked satisfactorily. Another little thing in connection with this was that the anal pipe was a small catheter, on the supposition that anything larger would be expelled; but with a small catheter inserted, 16 to 18 size, the sphincter seemed to be very tolerant. Dr. Batchelor emphasized the two points, the early diagnosis and the prompt and quick operation, and he thinks that the sudden onset of pain and the restricted abdominal motion are the two points one would rest most largely on in making a diagnosis. He considers those two symptoms of far more importance than changes in the pulse rate and temperature.

Dr. J. E. ALLABEN, Rockford, Ill., said, in regard to the symptoms about which Dr. Murphy spoke, that it has generally been considered that those symptoms are caused entirely by the absorption of septic material. The experiments of Buxton demonstrate that it is usually not the absorption of septic material but the absorption of large quantities of bacteria, which undergo disintegration in the blood and liberate their endotoxins, producing the symptoms of shock and collapse. Regarding Dr. Hammond's remarks, Dr. Allaben did not see how he had any foundation for saying, so far as this particular case is concerned, that there was intestinal disease previous to the typhoid fever. He did not agree to that, because there had been no indications of intestinal disease at any time before the attack of typhoid, and he did not believe that intestinal disease ever existed. The perforation undoubtedly occurred from the ulceration of a solitary gland caused by infection from the typhoid bacillus. With reference to Dr. Fox's patient who died from neglect to open an abscess, Dr. Allaben suggested that the case was one of appendicitis complicating typhoid fever. The appendix is often infected in typhoid by the typhoid bacillus, and it must be apparent to all that appendicitis may complicate typhoid, a simple appendicitis occurring in the course of typhoid. That is one of the things one must look for, and operation in such cases is always followed by excellent results. Regarding Dr. Bartlett's suggestion to stitch the perforation of the intestine into the abdominal wound, he thought that this procedure might be satisfactory if one could be sure that there is but one perforation. Other perforations may be present and be overlooked. Again, obstruction might be produced by kinking of the intestine. In all cases of septic peritonitis, the formation of adhesions is avoided by early evacuation of septic material. Adhesions are caused by the advancement of septic peritonitis. By operating early, these adhesions are limited.

Surgical Treatment of Goiter.—Dr. George A. Bingham, Toronto, in his presidential address before the Ontario Medical Association, May, 1907 (*Canada Lancet*, July 1907), states that in goiters affecting both lobes his experience has shown that it is not enough to remove one lobe and the isthmus, as cystic degeneration will continue in the remaining lobe. It would seem to be safer, after having removed the lobe most affected, with the isthmus, to incise the capsule of the remaining lobe and to enucleate every cyst to be found.

A CASE OF INFANTILE MYXEDEMA.

JAMES FREDERICK CLARKE, M.D.

FAIRFIELD, IOWA.

The case here presented is the fourth of sporadic cretinism brought to my attention in this part of Iowa. Such a number found in a limited territory inclines me

Fig. 1.—The child at beginning of thyroid treatment, March 18, 1906.

Fig. 2.—Profile of child, March 18, 1906, at beginning of treatment.

Fig. 3.—Child after less than seven months' thyroid treatment, Oct. 4, 1906.

Fig. 4.—Child after fourteen months' treatment, May 27, 1907.

to the belief that the condition is much more frequent in the United States than is commonly supposed.

Patient.—P. Z., male, aged 18 months, was sent to me by Dr. C. S. Bishop of Glasgow, Iowa.