threatening moment; (4) he must not delay calling in a surgical colleague.

Sudden abdominal pain, accompanied or soon followed by spasm, and later by tenderness, probably, but not necessarily, localized, coming on at or after the middle of the second week, are symptoms not to be lightly regarded. Vomiting may or may not occur. Rapidly increasing leucocytosis is highly confirmatory, but we must remember that operation has proved the existence of perforation and peritonitis without increase in the white count. Here, as in other diagnostic problems, it is the association of symptoms and signs — the whole picture — which counts rather than any one symptom or sign. Rapidly increasing distention in connection with the above indications suggests that peritonitis is general.

The milder the typhoid, the more free from distention the patient; the less toxic he is, the more classic are the symptoms likely to be, other things being equal. This is fortunate, inasmuch as the hope from operation is small in a patient exhausted by a severe acute infection of usually at least two weeks' duration, with an intestine more or less parietic, with the sensorium so benumbed that it recognizes only feebly, if at all, the supervention of perforation. While perforation cannot be recognized in a certain proportion of cases, I strongly incline to the opinion that the pronounced typhoid state is distinctly less common now than thirty-odd years ago, in my undergraduate and interne days, thanks to more rational treatment and a vast improvement in nursing.

Moreover, the fact that the early recognition of perforation may through operation save life in itself leads to greater alertness on the part of the physician than was called for in the days when opium was practically the only weapon against this form of the *vis lethalis naturae*. Nowadays, only the minority of perforations go unsuspected or unrecognized in good hospitals or under good care in private. It is surely desirable that recognition should be early and that surgical consultation be held as soon as possible. The interest of the patient is thus better safeguarded. Were medicine and surgery less closely intertwined than they are, the duty of the physician might be said to be done after recognition and calling a consultation, but many a man must, perforce, be both physician and surgeon, and, where limitation of practice is possible, there are more surgeons who practice medicine than there are physicians who practice surgery.

General considerations and the experience of the past must be given due weight in conjunction with the special features of each case before the decision is reached, whether and when to operate. I have believed that in a patient in fairly good condition and with undoubted perforation operation cannot be done too early. There seems to be some division of opinion among surgeons whether it is not wiser to wait until the first shock of the perforation has passed. There appears to be warrant for this division in the Massachusetts Hospital cases for the past ten years. I note

that in the six recoveries after operation, the apparent interval between the first indication of perforation and operation was twenty-three, twenty-four, twenty-three, twelve, eight and four hours.

In 8 of the fatal operated cases, the interval was twelve hours or less. In 2 cases it was less than two hours. One of these was mine, as favorable a case for operation as one could wish for. When I made my visit in the ward, the man, who had given me no anxiety, was asleep, and, looking at his chart, I passed him by. Before I left the hospital he was reported as having severe abdominal pain. I went back to him and in about an hour he was under the knife, but died.

In the other 6 fatal cases, the interval ranged from eighteen to thirty-six or more hours. In one of these, the first symptom of perforation occurred sixty hours before operation and general peritonitis had existed twenty-four hours before, yet the patient withstood the operation and died nine days later from a secondary perforation.

It would seem to me that better results in the future are to be looked for through prompt recognition of the condition, more accurate knowledge than we seem to have at present as to the time of election, with due consideration of the special features of each case, and realization of the fact that a patient with perforation in the course of an acute, though prolonged, infection tolerates anesthesia and intervention less well than one in full health with perforation of the stomach or appendix.

MISTAKEN DIAGNOSIS IN CASES OF TYPHOID PERFORATION.*

BY C. L. SCUDDER, M.D., BOSTON.

Visiting Surgeon, Massachusetts General Hospital;
Lecturer on Surgery, Harvard Medical School.

CONSIDERABLE interest and importance attaches to the knowledge of those cases of typhoid fever, in which a mistaken diagnosis of intestinal perforation has been demonstrated by operation. These instances of mistaken diagnosis fall naturally into three groups: (1) Those in which no lesion is discoverable; (2) those in which the lesion found does not involve the peritoneum; (3) those in which the lesion is found within the abdomen, involving the peritoneum.

In the first group of "no lesions found" are the following: The case of Harrington & Bowlby,¹ in which there were symptoms of typhoid perforation on the twenty-eighth day of the disease; the two cases of the collection of Shattuck, Warren and Cobb,² cases 22 and 23 of the first report, and the three cases recorded by Scott,³ of Philadelphia, in a recent paper.

To the second group belong cases of pneumonia (Scott⁴ records three cases), of gastritis, of enterocolitis and of hemorrhage, of Zenker's degeneration of the abdominal muscles (beginning

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with hemorrhage into the muscle), one case of a distended urinary bladder.

The symptoms of intestinal perforation, sudden abdominal pain, tenderness and rigidity, together with distention, vomiting and rapid pulse, are also symptoms of a peritonitis. Certain causes of peritonitis will be mistaken for typhoid perforation.

To the third group of cases of mistaken diagnoses belong certain of the lesions causing peritonitis, viz., *cholecystitis* and perforation of the gall bladder. Erdmann's⁵ paper has noted a personal case and three cases from literature, which, added to Keen's⁶ paper, makes a total of 34 cases of perforation of the gall bladder. Seven operations were done in these 34 cases; five complete operations, with one death. All of the unoperated cases died.

Killiani⁷ recently reported a case with two perforations of the gut and a perforation of the gall bladder during the fourth week of the disease. The patient lived twenty-one days after operation and died of gangrene of the lungs and empyema.

Allyn, of Philadelphia, reported in 1901 a typhoid case which died three days after operation, in the third week of the disease. No lesion was found at operation. At autopsy, however, there was discovered an opening in the gall bladder communicating with a small opening in the hepatic flexure of the colon.

Willis reports a perforated gall bladder during typhoid fever, in which two weeks after a cholecystostomy the patient died of peritonitis. A cholecystectomy might have terminated differently.

Ovarian cyst infections are recorded during the active period of typhoid fever. One case by Sudeck⁸ and two cases by Lewis, Harte and LeConte⁹ appear recorded. Five infections of dermoid cysts of the ovary are recorded, which were operated upon from three to eight months subsequently to the typhoid fever. Such are the cases of Werth,¹⁰ Pitha¹¹ and Wallgren.¹²

Rotation and strangulation of Meckel's diverticulum is reported by Sailer and Frazier¹³ to have occurred in a young adult male, during the acute course of typhoid fever — operated upon as if for a perforation of the gut.

Case XXI, Shattuck, Warren and Cobb, series 1, and the case of Körte, of Berlin, are instances of a rupture of infected mesenteric glands during the course of acute typhoid fever. In each of these cases a pure culture of the typhoid bacillus was secured from the peritoneal cavity at the time of operation.

Femoral and iliac thrombosis in three of Scott's series cause confusion in diagnosis. Thayer¹⁴ records two such instances in Baltimore.

Of very great interest are the cases mentioned by Finney,¹⁵ in which perforation of the intestine during the course of typhoid occurred without demonstrable typhoid bacillus, and also of interest are those cases in which a fatal *peritonitis* may develop a discoverable perforation. The Munich autopsies record 2.2% of such cases.

Gairdners'¹⁶ Glasgow cases, five in number, are of this latter kind.

There is no doubt that an impending perforation exists in many cases — as illustrated in Case XXIV of the Shattuck, Warren, Cobb, 1st series; Case II, B. C. H. series; Scappacci, M. G. H. series, and Ayer, M. G. II., 2d series.

Murchison mentions as a cause of peritonitis during typhoid, softened splenic infarcts, abscesses in the bladder wall, abscess of the liver.

Mention is made in Scott's series of one case of a rectal ulcer and one case of pericolicitis, mistaken for a typhoid perforation. Cases of appendicitis are occasionally operated upon for typhoid perforation.

I would especially call attention to a personal experience, in the following case:¹⁷

Adult female. Typhoid fever; end of the third week acute abdominal pain; rupture of an old pyosalpinx; rupture occasioned by an acute infection of the pyosalpinx by the typhoid bacillus. Diffuse peritonitis. Salpingectomy; the abdominal cavity irrigated and drained; the abdominal fluid contained a pure culture of the typhoid bacillus. Recovery.

A. C. S., thirty-eight years old, married. A patient of Dr. Stowe, of Medford Hillside. Massachusetts General Hospital No. 137,446.

She has always been well excepting for children's diseases.

About four weeks ago she was taken ill with malaise, cramps in the stomach and bowel and diarrhea. She went to bed May 15. She entered the hospital May 20. The abdomen was full, moderately distended, tympanitic, and the abdominal muscles were somewhat rigid. The spleen was not palpable. The temperature was 102.2° F. Pulse, 102. Respiration, 32. Hemoglobin, 80%, white blood count, 9,900. May 22 several rose spots were noted. Appearance, typhoidal. May 23, Widal reaction positive.

June 5, no distention, temperature nearly normal, very comfortable. June 8, at half past six in the morning, she had a severe abdominal pain. This pain was most intense in the lower part of the abdomen. The pain appeared just after a natural movement of the bowel. Immediately following this attack of pain the abdomen was held rather rigidly, and was moderately tender in the lower part. The pain was followed by a chill, and the temperature rose to 103.6° F. Slight shifting dullness was noted in the flanks. The rigidity of the abdominal muscles had increased. The white count rose from 9,000 to 18,000. An hour after the last chill the temperature rose to 104½°. At twelve o'clock, noon, the temperature was 105° and the pulse 130.

Vaginal examination discovered a fullness and increased resistance in the left cul-de-sac and a suggestion of boggy mass. Operation at this time by a median incision below the umbilicus disclosed free, thick puriform fluid throughout the abdomen. There was no fecal odor to the fluid, nor was there any gas in the abdomen. The appendix was normal. The ileum was examined for several feet above the cecum and no perforation was found. The pelvis, where the pus was most abundant, was explored and a mass was found to the left of the uterus which proved to be a pyosalpinx, and corresponded to the tumor felt upon vaginal examination. The salpingitis was a chronic one. The wall of the sac was thick and edematous and had ruptured allowing the escape of the contents of the sac into the abdominal cavity. A salpingectomy was done leaving the left ovary. The abdominal cavity was flushed with salt solution. A gauze wick and

rubber tubes were placed in the pelvis. Excepting for a rise in temperature upon the ninth of the month, about nine days after the operation, convalescence was uninterrupted. The rise of temperature was thought at the time to be indicative of a slight relapse of the typhoid infection. The wick to the pus cavity was entirely removed upon the morning of the fourteenth, and the gradual rise in the temperature from the fourteenth to the nineteenth would suggest that retained puriform material might have been the cause of the temperature.

Pathological report: A large pus tube which had ruptured in the course of typhoid fever. The walls of the tube were covered with exudation and upon microscopical examination showed a fibrous structure with a general round-cell infiltration. Diagnosis, chronic salpingitis.—W. F. WHITNEY, M.D.

The bacteriological report, by Dr. Oscar Richardson, from the Clinico-Pathological Laboratory of the hospital, is as follows: The culture showed about fifty small to medium sized, round, grayish-white, glazed colonies of a bacillus like the typhoid bacillus. Sub-cultures showed the typical growths of the bacillus of typhoid fever. Widal reaction was immediately positive with blood from a known case of typhoid fever in dilution of 1-10. The bacillus is regarded as being the bacillus of typhoid fever.

A case of pyosalpinx is referred to by Wilson, according to Fitz, and one reported by Mabit¹⁸ (1893). In neither of these latter two cases was a bacteriological examination made. These are the only cases of pyosalpinx complicating typhoid fever I can find recorded.

Doubtless some relapses in typhoid cases are due to recent infections of the gall bladder, to impending perforations of the gut or to infections of old pus sacs and ovarian cysts.

The surgeon, before operating upon a suspected typhoid perforation, should examine the pelvis of female patients and should consider, as possibly present, the lesions thus far recorded as complicating the diagnosis.

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PERFORATING TYPHOID ULCERS.*

BY FARRAR COBB, M.D., BOSTON,

Surgeon to Out-patients, Massachusetts General Hospital.

I HAVE been very much interested in Dr. Harte's complete and thorough paper, and what I have to say can add little, if anything, to what he has said and can only serve to emphasize his conclusions. I have studied, however, the cases operated upon at the Massachusetts General Hos-

pital in the last ten years, and the analysis of these cases may be of interest to Dr. Harte and the members present.

In the early part of the year 1900 a committee from the Boston Society for Medical Improvement, consisting of Dr. George B. Shattuck, Dr. John Collins Warren and myself, made a careful study of all the cases of perforation in typhoid between the years 1895 and 1900 at the Massachusetts General Hospital, the Boston City Hospital, the Children's Hospital and St. Elizabeth's Hospital. It was my privilege to read the report of this committee at a meeting of the society.

Since I was asked to take part in the discussion of Dr. Harte's paper, I have studied all the cases of perforation in typhoid at the Massachusetts General Hospital, both those operated upon and those not operated upon, between the years 1896 and 1906. My chief purpose in doing so was to see whether the new series of cases, the majority of which occurred in the years after the report of the Improvement Society was published, would give any new information as to diagnosis and treatment, or change in any way the conclusions made in this previous report.

Of the twenty cases operated upon at the Massachusetts General Hospital between 1896 and 1906, eight cases were included in the report of the Improvement Society; the other twelve are new cases. The important conclusions of the paper read in 1900 were as follows: certain typhoids are so sick that perforation and spreading peritoneal infection cannot be diagnosed until widespread and of fatal extent. A number of typhoids may have sudden perforation with free extravasation; in these the symptoms are fulminant, but at first in some cases may be localized to a certain extent; in these cases operation must be done at once, for general peritoneal infection can become past relief in from one to five hours. In the majority of mild typhoids, beginning peritoneal infection, whether from actual perforation or necrosis of the intestinal wall, is marked by less severe warning symptoms, localized abdominal pain, tenderness, muscle spasm, with or without leucocytosis; the severe symptoms following mean general peritonitis. These warning symptoms demand serious consideration and study, but in many cases are not rightly understood or not acted upon. Complaint of abdominal pain in a typhoid should also lead to a suspicion of beginning peritoneal infection. Frequent leucocyte counts are needed in every case, and an hourly count is recommended in the presence of abdominal pain. Pain associated with localized tenderness, muscle spasm and a rising white blood count points in most cases to an operation, in all cases to a surgical consultation.

In the light of my recent study I see no reason to change the conclusions of seven years ago, with the following exception: leucocytosis, if present, may give valuable corroborative evidence, but operation should be done where there is pain and localized tenderness and muscle spasm, whether or not there is leucocytosis. The presence of leucocytosis, especially the demonstration

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