principle is a negative argument in favor of Cohnheim's and Ribbert's theories, excluding as it were the possibility of any other explanation for cell division. More promising, however, than the discussion of the above stated principle seems to be, at least with regard to the tumor problem, an analysis, and especially an experimental one, of the facts of embryonic development and of the regenerative processes. The latter must be an individual one for the different tissues which may behave differently. And here new methods must be worked out for new problems which suggest themselves. As Herbst and Spemann made it very probable that the touch of certain parts of the optic vesicle caused the skin of the head (and probably any part of the skin of the head) to form the lens, so G. Wolff demonstrated recently that the regenerative growth of the cut-off extremity of a triton does not take place if the medulla and the spinal ganglia are removed. In these cases we certainly can not speak of a removing of mechanic tension as the cause of growth. If the meaning of the removing of tension does not restrict itself to mechanic tension, it would be only used in a metaphorical sense and might mean any change of a chemical or physical nature; it would therefore essentially not be different in its meaning from the conception of a formative "Reiz." These causative factors for growth are at present still mostly unknown to us. Their analysis will also be necessary for a full understanding of the etiology of tumors. For even if micro-organisms shall have been definitely demonstrated as the cause of tumors, great as this achievement would be, the problem would still remain how such physical or chemical conditions created by the micro-organism can be the exciting factor of increased cell division.

DISCUSSION.

DR. H. D. PEASE, Albany, N. Y.—Before many of the phenomena observed in tumor formation and the production of metastases can be explained we shall certainly have to know more about the physiology of normal tissue elements, both embryonic and adult. Such questions lead to a discussion of the problems of cell division, tissue differentiation and inheritance. Even if it is eventually found that micro-organisms have an etiologic relation to malignant tumor formation, many of the phenomena which occur in such formations will require for their explanation a consideration of these problems.

REPORT OF A CASE OF TYPHOID PERFORATION WITH GENERAL PERITONEAL INFECTION

AND FIVE OTHER CONSECUTIVE CASES OF GENERAL SUPPURATIVE PERITONITIS; ALL RECOVERED.

J. B. MURPHY, A.M., M.D.

CHICAGO.

It is the prevalent opinion of the profession that practically all cases of general suppurative peritonitis should terminate fatally. That this is not true, however, is forcibly illustrated in the cases here reported. The questions arise, therefore: 1. What are the conditions which produce the fatal result? 2. Can these be overcome by medical or surgical treatment, and if so, when and how?

General suppurative peritonitis is not necessarily a fatal disease. The result of a general peritoneal infection depends on the following:

(a) *The type of infection.* If it be a virulent streptococcus type, with little pus formation, the peritoneum is rapidly denuded of the epithelial covering and becomes a "blistered surface" through which absorption rapidly

takes place. Death in these cases is caused by the large quantity of the products of infection rapidly absorbed. If the poison be diluted or the pressure under which the infective products are retained be reduced the patient may pass over the critical period to a convalescence. If it be a staphylococcus or colon bacillus infection, the denudation of the peritoneum is slower, the danger of immediate overpowering of the patient by the absorbed toxins is diminished and the fatal termination is postponed often to four or six days, until such time as the fibrinous exudate which covers the peritoneum is exfoliated, taking with it the peritoneal endothelia. A rapid and fatal absorption may then ensue.

(b) *The period of time that elapses between the infection and the time of operation.* In the past the diagnosis of perforation was based on the combination of symptoms included under the term collapse, which was believed to occur a few hours after the perforation took place. At present the diagnosis of acute infectious perforative peritonitis is based on the symptoms of pain, nausea and vomiting, localized tenderness, circumscribed flatness on piano percussion, elevation of temperature and hyperleucocytosis, in the order mentioned. With these symptoms many of the patients give a history of diseased conditions which predispose to the development of perforative peritonitis. The operation should, therefore, be performed as soon as these symptoms are manifest. If it be postponed until the patient is in collapse the case will terminate fatally. If it be performed, however, in the early stage, the "peritoneal shingles" or endothelia will be found intact, thus preventing absorption. When these natural barriers to absorption are destroyed, as is the case when operation is delayed, a fatal termination can not be obviated.

(c) *The tension under which the products of infection are retained in the peritoneal cavity.* The mere pressure of pus in this situation does not necessarily mean absorption of the infective products. The greater the pressure under which the pus is held in these acute conditions the more rapid the absorption. This is true, not only in the peritoneal cavity, but also in suppurations in the cellular tissue in any portion of the body. Remove the pressure and there is an almost immediate cessation of absorption, as is shown by the sudden subsidence of the symptoms of infection after draining an abscess in any portion of the body, notwithstanding that pus remains in this cavity after it has been opened. The reduction of pressure is one of the basic principles of treatment of cases of general suppurative peritonitis. We believe, and have shown, that irrigation is not necessary in the peritoneal cavity any more than it is in circumscribed suppurations of other tissues.

(d) *The diffusion of the infective material through the peritoneal cavity.* It is well known that when this diffusion takes place in the upper half of the peritoneal cavity the danger is enormously increased, because absorption from this part is much more rapid than from the lower or pelvis portion. On this basis all patients were kept in the semi-sitting position, at an angle of thirty-five degrees, from the time they came under observation, both before and after operation, until the pus was entirely removed. In all the cases an effort was made to allow the pus to settle into the pelvis, where it would be free from pressure and could be easily carried off by the drainage tubes. In this way absorption took place slowly and the patients were saved from the primary, overwhelming dose of toxins, which is so fatal.

(e) *The administration of antitoxins and other substances to antidote or dilute the immediate depressing effects of the poisons absorbed from the peritoneum.* Antistreptococcus serum and unguentum Crédé were administered to our patients, on the conviction that they contributed to this result to some degree. We believe that time is saved by their administration, in counteracting the effects of the poison, and the patient's chances for recovery are, therefore, increased. Saline transfusions were given some of the patients for the same purpose, as well as to increase the arterial tension when low.

(f) *The length of time the patient is kept under the anesthetic and the extent of manipulation of the intestines and other tissues to which the patient is subjected during the operation.* The patients were not killed on the table. I believe a large number of lives are sacrificed in operations for general peritonitis by excessive manipulation of the infected tissues and by sponging and irrigation of the peritoneal cavity. If the patient becomes severely depressed, collapsed or shocked on the table, it is practically certain that death will ensue; and, therefore, no operation which produces these conditions is justifiable. In all of these cases a general anesthetic was used, as it is my belief that sufficient time can be saved by working under general anesthesia to more than compensate for the dangers attending its use, and time is of vital importance in operations of this character.

The following report will illustrate the various phases of the individual cases:

CASE 1.—Mr. J. D., aged 35 years, laborer. Admitted to Mercy Hospital, Nov 18, 1902. Patient referred to me by Dr. D. Collins, with diagnosis of typhoid perforation.

PRESENT ILLNESS.—The patient was in the third week of a well-defined attack of typhoid fever and was progressing favorably. At 3 p. m. on the day of admission to hospital he experienced a sudden, severe, sharp pain in the umbilical region. Soon after onset of pain it became general over the lower half of the abdomen, he vomited and a considerable degree of tympany developed. When I examined him at 8 p. m. he was in the semi-sitting position and the abdomen was moderately distended and tender all over. On percussion there was tympany over the upper part, with dullness in the right flank and lower portion of the abdomen. The line of dullness changed with change in position of the patient. Dr. Collins' diagnosis of typhoid perforation was sustained and patient immediately sent to hospital for operation. In conveying him from his house to the hospital he was kept in the semi-sitting position on the stretcher and this position was maintained on the table throughout the entire operation. Ether was the anesthetic used. The pulse before beginning the anesthetic was 130 and respiration 30, rapid, shallow and entirely costal in type. There was, however, in this case, an absence of the symptoms of collapse. Camphorated oil, minims 10 and strychnia sulph. gr. 1/30 were given hypodermically before starting the anesthetic.

Operation.—10 p. m. Incision below the umbilicus and through the right rectus muscle was made in opening the abdomen. As soon as the peritoneum was incised a large quantity of yellowish green fluid containing flakes of lymph exudate, welled out of the opening. This fluid was free in the peritoneal cavity and there were no adhesions. The entire peritoneal surface was deeply congested and covered in places with white patches of exudate. The luster and gloss of the membrane were, however, preserved. The caput coli was first sought and drawn out of the wound, and the ileum traced from here. On drawing the latter out it was found greatly thickened in places and its peritoneal covering showed the most intense degree of congestion and infiltration. About twelve inches from the ilio-cecal valve a perforation of the intestinal wall was found, 4.5 m.m. in diameter, through which the contents

of the ileum were escaping. The perforation was in the center of an indurated, infiltrated, Peyer's patch, and there were no evidences of the formation of adhesions in the neighboring intestinal coils. The perforation was closed by a double row of silk Lambert sutures, introduced in the healthy tissue, well to the side of the infiltrated Peyer's patch. In this way the bowel wall was folded inward longitudinally, from each side, and it completely buried the ulcer, with the perforation in its center. When the suturing was completed the lumen of the bowel was considerably narrowed, but this was unavoidable, as any sutures introduced into the infiltrated tissue would have torn through. After closing the perforation the coil was dropped back into the abdomen and the incision closed in separate layers, catgut for the peritoneum and fascia of the rectus and horsehair for the skin. The fluid was not sponged out. Two rubber drainage tubes, ½ in. in diameter, were inserted deep into the pelvis, and came out through the lower end of the incision. Through these tubes the pelvis was irrigated with normal saline solution and a large quantity of greenish fluid escaped. The pulse became very weak and rapid towards the end of the operation, so a quart of normal saline solution was given intra-venously. Time of operation, 27 minutes.

Patient was returned to his room at 10:40 p. m. and placed in bed in a semi-sitting posture at an angle of 40 degrees. This position was maintained for ten days. After he was put to bed his pulse was 140 per minute and weak. Camphorated oil, minims 10 and strychn. sulph. gr. 1/30 were given hypodermically. At 11:30 pulse was 140, very weak, and respirations 40 per minute. A second intra-venous transfusion of 20% normal saline solution was given and hypodermics of: caffeine gr. 2, camphorated ether minims 10, strychn. sulph. gr. 1/30, and digitalin gr. 1/50, ordered every four hours. At 12 p. m. 10 c.c. of antistreptococcus serum was given hypodermically and the dose repeated at 3 and 6 a. m. He rested quietly during the night except when disturbed to take his medicine; passed urine freely. The pulse gradually became slower and stronger and by 8 a. m. was 100 per minute, with temperature 99 (Ax) and respirations 34. Wound was dressed and the dressings found saturated. Inunctions of ung. Crédé were ordered daily. At 11 a. m. pulse again became weaker and he was given a saline enema, which was retained. P. m. temperature 100.6, pulse 100. Saline enemata were repeated after this every five hours and water given freely by mouth after 6 p. m. the day following the operation; the urine showed albumin and hyaline and granular casts.

November 20, a. m., temperature 101.4, pulse 96, respirations 26. He had a good night and expressed himself as feeling well. He vomited several times during the day, complained of some epigastric pain and slept at intervals. The camphorated ether and caffeine which had been given hypodermically every four hours were stopped, but the digitalin and strychnin sulph. were continued. His pulse during the day decreased in frequency from 100 in the morning to 86 at 6 p. m., at which time his axillary temperature registered 100.6 and respirations 28. 1,300 c.c. of urine was excreted during the 24 hours. Bowels did not move, and he retained his enemata. Urine still contained albumin and casts (hyaline).

November 21, a. m., temperature 99 (ax.), pulse 68, respirations 30. Patient did not sleep much during the night, but rested quietly. He vomited several times during the day and developed a slight cough, with moderate amount of expectoration. During the afternoon two low enemata were given at intervals of four hours, and produced slight bowel movement. P. m., temperature 101 (ax.), pulse 88. Digitalin stopped. Urine abundant.

November 22, a. m., temperature 99.6, pulse 76; p. m., temperature 100.6, pulse 80. Bowels moved freely. Slight cough persists and sputum blood tinged.

November 23, a. m., temperature 98, pulse 70; p. m., temperature 99.6, pulse 74. From this date pulse and temperature remained practically normal and patient convalesced rapidly. He sat up in chair December 8. Drainage tubes were gradually shortened and diminished in size as the discharge lessened, and

were removed altogether Dec. 10. He was discharged from the hospital with wound almost entirely closed December 12.

CASE 2.—Mr. F. B. T., aged 26 years. Admitted to Frances Willard Hospital July 12, 1902.

Previous History.—Negative. Family history, negative.

Present Illness.—Three days previous to admission to hospital patient was attacked with severe pain in the right iliac fossa, accompanied by nausea and vomiting. Temperature reached 100 on the evening of the attack. The next day the pain was more circumscribed and remained so until the morning of the third day, when it suddenly became general over abdomen, and considerable tympanitic distension of the abdomen developed at the same time. It was decided that the patient had a perforation of his appendix, with general peritonitis. He was transported seven miles in a wagon to the railway station and four hours on train to Chicago. When he arrived here his pulse was 130 and temperature 101.5. Abdomen was much distended and flat on piano percussion in the flanks and lower portion. Leucocyte count on the evening of the third day showed 50,000 per cubic mm.

A diagnosis of perforative peritonitis was made, though the patient was not vomiting and not in the least collapsed.

Operation.—July 12, 1902. Abdomen opened by ordinary appendiceal incision through outer edge of right rectus muscle. When the peritoneum was opened pus with gas shot out, so great was the tension. The appendix was gangrenous and perforated. Appendix removed and large drainage tube inserted into the pelvis and right iliac fossa. No abdominal sponging or irrigation was used. There was no attempt on the part of the intestines or omentum to wall off the infective process. The bowel retained some of its normal gloss, but the pus was very offensive and the case did not look promising. Abdomen closed by figure of eight sutures of silkworm gut down to the drainage tubes.

Patient was placed in his bed in the semi-sitting position, at an angle of 35 degrees. Repeated saline enemata were administered and large quantities of fluid given by mouth immediately after the patient regained consciousness. The tubes were left in for two weeks, but during this time were gradually shortened as the discharge lessened. The temperature rapidly subsided to normal after the operation and the patient made an uninterrupted recovery. In this case, as in most of the others, inunctions of ung. Credé were given daily for one week. Anti-streptococcus serum was not given.

CASE 3.—Mrs. K., aged 50. Admitted to Mercy Hospital Oct. 12, 1902. Family history negative. Personal history negative.

Present Illness.—After breakfast, October 9, patient was taken suddenly ill with severe cramping pain in umbilical region. Soon after onset of pain she became nauseated and vomited freely. Pain continued general over abdomen for sixteen hours, when it became localized to the right iliac region and vomiting, which had been persistent, subsided. She had fever during this time, but does not know how much, and was very tender to pressure in the appendiceal region. After 36 hours pain lessened, but soon afterwards reappeared and was severe. It was now general over the entire abdomen and not localized to the right side. I saw the patient in consultation with Dr. George W. Webster on the evening of October 12, and concurred in the advisal of immediate removal to the hospital and operation.

Operation.—October 12, 10:30 p. m. Usual appendiceal incision through the right rectus muscle into the peritoneal cavity. On incising the peritoneum pus welled out. There were absolutely no adhesions anywhere in the peritoneal cavity, and the pus was distributed everywhere. The appendix presented considerable swelling and was perforated near its base, the perforation taking place into the free peritoneal cavity. No fibrinous exudate was found on the intestines, and there was no effort at agglutination. After ligating the mesentery and appendix, the latter was amputated. Two large rubber drainage tubes, $\frac{1}{2}$ inch in diameter, were inserted, one deep in the cul-de-sac and one in the right iliac fossa. The abdominal wall was closed with figure of eight sutures of silkworm gut. No

irrigation was used and the pus was not sponged out. In this case the peritoneum showed considerable congestion, but the normal gloss was retained, showing that the endothelial covering was intact. Patient was put to bed in semisitting posture at an angle of thirty-five degrees. With each inspiration the pus welled out of the pelvis through the tubes. At 11:15 p. m. pulse was 120, and at 12 126, with respirations of 40. As soon as she was put to bed she was given strychnia sulph. gr. 1/20, digitalin gr. 1/50, caffein cit. gr. 2 hypodermically.

October 13, patient rested quietly during night and vomited only a few times. She took water freely and retained much of it; a. m., temperature 99.8, pulse 98; p. m., temperature 101, pulse 104. Hypodermics of strychnia and caffein were continued every four hours. Dessertspoonful doses of the infusion of digitalis were ordered every three hours to increase the secretion of urine, which was small in quantity and contained considerable albumin and many hyaline casts. Patient vomited only once during the day and took water freely.

October 14, patient had good night; a. m., temperature 99.2, pulse 98, respiration 30; p. m., temperature 99.6, pulse 96. Urine now abundant, no albumin present, but hyaline casts still numerous. About noon patient was given a saline enema and this was followed soon afterward by a slight bowel movement. She had two more small passages during the afternoon. In the evening the following prescription was ordered every six hours: Ox gall grs. 5, ex. belladonna gr. 1/20, ex. nuxvomica gr. $\frac{1}{4}$, aloin gr. 1/10.

October 15, a. m., temperature 99.2, pulse 96; p. m., temperature 99.4, pulse 88. Patient expelled considerable gas from bowels, but did not have a free movement. Wound was discharging freely.

October 16, during the preceding 24 hours patient passed 1,500 c.c. of urine, which contained no albumin and very few casts. The infusion of digitalin discontinued, as were also the hypodermics of caffein; a. m., temperature 99.8, pulse 90; p. m., temperature 99.6, pulse 96. During the day patient had five bowel movements and passed a good deal of gas.

October 17, a. m., temperature 99, pulse 96; p. m., temperature 100.2, pulse 84. From this date until October 21 temperature in the evening ranged between 99.6 and 100.4, with pulse 88 to 96. The discharge continued quite profuse and was somewhat offensive. Bowels moved daily during this time and she complained but little of pain in abdomen. From October 21 to November 4 p. m. temperature ranged from 99 to 99.6, with pulse from 82 to 90. During this time the discharge decreased in quantity and the wound was dressed with gauze soaked in a saturated solution of sodium bicarbonate to overcome the offensive odor. She complained little of pain; bowels moved freely daily and urine was abundant. The drainage tube in the right iliac fossa was removed October 25 and the pelvic tube four days later.

November 4, patient complained of pain and tenderness in the left iliac fossa and her temperature on this date went up to 101 in the afternoon. The next day a tender induration was palpable in this region and it was evident that pus was here retained. Induration and temperature persisted until November 8, when the accumulation discharged spontaneously into the canal left after removal of the drainage tube. After this her temperature rapidly descended to normal and continued so. Patient sat up in chair November 8, and was discharged from the hospital November 23, with the wound almost healed.

CASE 4.—R. G., male, aged 16 years. Referred by Dr. Anna Dwyer.

Previous History.—During past three years had been subject to frequent attacks of abdominal pain, at times localized in right iliac fossa; no severe acute attacks. Present illness began October 18, 1902, with intermittent abdominal pain, which continued until next afternoon, when he vomited. Pain generalized at first, later localized in right iliac region. Cathartics were administered by attending physician, but were not retained. Vomiting continued for 18 hours, when it became less frequent; the pain, however, remained severe. At 4 p. m., October 20 temperature was 101.2 and pulse 100. A well-

defined mass was present in the right iliac fossa. The author saw the case at 9 p. m. and advised immediate operation, but to this the parents would not consent. The next day the abdominal pain had increased greatly in severity and was generalized over the abdomen. Simultaneously with the increase and generalization of the pain the tumor mass became much less clearly defined and diffuse tenderness developed.

Operation.—Performed 7:30 p. m., October 21. The usual incision was made through right rectus muscle, into the peritoneal cavity. On incising the peritoneum the pus welled out and was free in the peritoneal cavity; with no adhesions except immediately around the appendix. The peritoneum was intensely congested and covered in places with fibrinous exudate. The gloss was preserved except in certain areas, where the congestion was most intense. The appendix was gangrenous and perforated on one side into the free peritoneal cavity. A large fecal concretion was present. Appendix was amputated and stump buried. Two large drainage tubes were inserted—one into the pelvis and the other into the right iliac fossa. Abdomen was closed with separate layers. No sponging or irrigation used. Patient placed in bed in semi-sitting position at 37 degrees.

At 8 p. m. pulse was 152. Strychnia sulph. gr. 1/30 given and repeated every three hours. At 9 p. m. 10 c.c. anti-streptococcus serum given hypodermically, and this dose was repeated at 11 p. m. and 2:30 a. m. Inunctions of ung. Crd given at 9:30 p. m. and 2:30 a. m. At 10 p. m. temperature 103 (ax.), pulse 140, respirations 24. Up to this time had drank five glasses of water since coming out of anesthetic. Rested quietly during the night and vomited only once.

October 22, a. m., temperature 102.6, pulse 120, respirations 36. Dressings saturated with discharge from tube. At 10:20 a. m. high saline enema given and ordered repeated every two to three hours. Water given freely. P. m., temperature 102.6, pulse 120, respirations 34. Patient given small dose of saline cathartic at 2:15 p. m., which was followed at 4:30 by a slight bowel movement and again at 7:30 in the evening. No vomiting.

October 23, patient had good night. A. m., temperature 101.4, pulse 100, respirations 28. Had one good bowel movement and expelled a great deal of gas from the bowels, both spontaneously and after enemata; p. m., temperature 101.4, pulse 92, respirations 30; wound discharging freely.

October 24, a. m., temperature 101.4, pulse 88, respirations 30. Wound dressed and 1½ inch of upper drainage tube removed. The gauze drain, which was left in with the upper drainage tube, was loosened. P. m., temperature 101.4, pulse 84, respirations 26.

October 25, a. m., temperature 100, pulse 80. Wound dressed and a portion of the gauze drain removed. P. m., temperature 100.6, pulse 80.

From this date until October 31 temperature ranged between 100 and 101 in the afternoon, with pulse gradually lessening in frequency from 80 to 76. After October 31 it remained normal morning and evening. October 28 sutures and gauze packing were removed. November 4 drainage tube was entirely removed and discharge was very slight. Patient was kept in bed in the semi-sitting position until November 7, when he first sat up. After this date wound healed rapidly and he made an uninterrupted recovery.

CASE 5—Mr. E. H., aged 19 years, occupation printer. Admitted to Mercy Hospital Oct. 25, 1902. Family and previous history negative.

Present Illness.—Began suddenly four days before admission with severe cramping pains in abdomen. Pain at first was more or less general and was followed after a few hours by nausea, vomiting and temperature of 102 F. After 24 hours the nausea and vomiting subsided, but the pain persisted and gradually localized in the right iliac region, where it remained for 72 hours. Temperature at this time was 101 to 102 F. At the end of third day the pain suddenly became more severe and spread over the entire abdomen. He had a chill, followed by profuse perspiration and the temperature rose to 103 F. When admitted to the hospital the next day, abdomen was

moderately distended and extremely tender all over. Breathing was almost entirely costal and the abdominal muscles held so rigidly that deep palpation was impossible. On piano percussion there was dullness extending up almost to umbilicus. An absence of peristalsis existed all over the abdomen.

A diagnosis of perforative appendicitis with general peritonitis was made and patient at once prepared for operation.

Operation.—Ether anesthesia. The usual appendiceal incision made through the outer margin of the right rectus muscle, into the free peritoneal cavity, which was found to contain a large quantity of yellowish pus, possessing a slight odor. The appendix was gangrenous and perforated. A circumscribed abscess had ruptured into the peritoneal cavity. The intestines were everywhere bathed in pus, but though considerably congested, they still retained their endothelial covering. Appendix was removed. Perforated rubber drain, one-half inch in diameter, inserted into most dependent portion of pelvis, and also into right iliac fossa. The pus was not sponged out, nor was the abdomen flushed. Time of operation 20 minutes.

Patient returned to his room at 1:30 p. m. in fair condition, pulse 128. Placed in semi-sitting position at 35 degrees and kept there for six days. When he regained consciousness three pints of normal saline solution was given per rectum and was retained. Temperature at 5 p. m. was 100 (ax.). At 6:30 p. m. 10 c.c. anti-streptococcus serum was given hypodermically, and this was repeated at 9 p. m. and again at 12. A second enema of normal saline solution was given at 7 p. m. and retained. At 9 p. m. temperature was 101 (ax.), pulse 120 and respiration 34.

October 26, a. m., temperature was 101.8 and pulse 106; p. m., temperature 100.6, pulse 112. Water was given freely and most of it retained. He vomited only twice during the day and his bowels moved freely three times, after being started by an enema given in the morning. One quart of saline solution was given per rectum every four hours, and 20 minims nuclein hypodermically at the same intervals. Urine was passed freely.

October 27, patient complained of some pain across abdomen; wound was dressed and a large amount of sero-purulent discharge found on the dressing. A. m., temperature 100 and pulse 100; p. m., temperature 100.8, pulse 100. Inunctions of 40 grains ung. Crd ordered daily. Bowels moved freely and urine was abundant. Patient complained very little of pain in the abdomen and rested well.

October 28, a. m., temperature 99.8, pulse 88; p. m., temperature 100, pulse 86.

October 29, a. m., temperature 98.8; p. m., 99.4. Ung. Crd stopped and soft diet ordered.

October 31, wound dressed and very slight discharge found on dressing. Nuclein discontinued.

Highest temperature 99.4 in the afternoon.

Temperature reached normal November 2 and remained so until the 10th, when he developed a slight pleurisy, which caused an elevation to 100 for four days. It then again dropped to normal. Patient made an uninterrupted recovery, sat up December 2 and was discharged well December 10. Drainage tube was gradually shortened and reduced in size as the discharge lessened. It was removed altogether November 19.

CASE 6.—Mr. F. McC. Admitted to Mercy Hospital Nov. 8, 1902. Family history negative. Personal history negative.

Present Illness.—About one month before onset of present trouble patient had a well-defined attack of appendicitis, lasting four days and from which he apparently completely recovered. He worked steadily from that time until onset of present attack. About 3 o'clock on the morning of November 8 patient was awakened by very severe, sharp pain in abdomen, about umbilical region. Soon after onset he became nauseated and vomited freely. Bowels did not move. He had no chill and temperature was not above 100 F. Symptoms continued until 8 o'clock a. m., when nausea and vomiting disappeared. He walked to the hospital, and was accompanied by his attending physician when admitted. Pain was still severe and abdominal muscles rigid, especially on right side. Tenderness to pressure was general over abdomen, but not very acute. A

diagnosis of acute appendicitis without perforation was made and patient persuaded to have an immediate operation. He came in during a clinic and one-half hour afterward was on the operating table.

Operation.—Nov. 8, 1902. Usual appendiceal incision through outer border of right rectus muscle, into peritoneal cavity. To our great surprise, on incising the peritoneum, it was found full of free pus with some gas. Examination revealed a perforation of the appendix. The perforation had been capped with the omentum, but through some accident on the night preceding his admission the cap was partially torn from opening and the contents had escaped into the peritoneal cavity. The probe could be inserted into the lumen of the appendix; the peritoneum was not "blistered," and its gloss was not seriously disturbed. The lower half of the abdominal and pelvic cavities contained large quantities of pus. Appendix was amputated; two large drainage tubes were inserted into pelvis. With each inspiration pus welled out of the tubes.

Patient was returned to his room at 1:15 and placed in bed in semi-sitting position, at angle of 35 degrees. Pulse 104 when he recovered consciousness. He vomited small quantity of greenish fluid, was restless and complained of pain in wound. At 6 p. m. pulse was 78 and temperature 99.4. At this time he was given $\frac{1}{2}$ gr. calomel and the dose was repeated at one-half hour intervals until 3 grains were given. At 6, 8 and 12 p. m. anti-streptococcus serum was given hypodermically in doses of 10 c.c. He slept some during the night, vomited once after taking 3ii mag. sulph., and at 4 a. m. was given a high rectal enema, which produced a free bowel movement. 300 c.c. of urine was passed.

November 9, a. m., temperature 99.4, pulse 92; p. m., temperature 100.6, pulse 108. Nuclein solution M. 20 was ordered every four hours, and inunctions of ung. Crd gr. 45, daily. Towards evening patient was restless and slightly delirious. November 10, a. m., temperature 98.8, pulse 88. Good bowel movement followed high enema. Still quite restless and slightly delirious at times. Complains of some pain. P. m., temperature 99.2, pulse 90. Calomel was given in divided doses, followed by mag. citrate, . Bowels moved twice. Wound was dressed and moderate amount of discharge found on dressing. November 11, a. m., temperature 99, pulse 76. Patient resting much more comfortably and bowels moved freely. P. m., temperature 100, pulse 84.

November 12, a. m., temperature 98.6, pulse 82; p. m., temperature 99, pulse 82. From this date until November 20 temperature ranged from 99 in the morning to 101 in the afternoon. On November 20 it reached normal in the afternoon and remained there until his discharge from the hospital. The drainage tubes were kept in for ten days, the tube being gradually shortened and diminished in size from time to time as the discharge lessened in amount. Dressings soaked in a saturated solution of sod. bicarb. were applied to the wound when the discharge was profuse to overcome the offensive odor, which persisted for six or eight days. Patient left the hospital December 6 cured.

This case illustrates forcibly what I have taught for years: That there is little or no depression immediately after perforation of the intestine and no collapse. In other words, collapse is a late manifestation and is the expression of the "blistering" of the peritoneum and absorption of the products of infection.

In this patient's case absorption did not have time to occur, as he was operated on ten hours after perforation took place. It will be noted that this patient was walking about the street with his physician, with his abdomen full of pus and a direct opening from his appendix into the free peritoneal cavity. Neither did I suspect the condition when I examined him before the operation.

No Medical Advertisements to the Laity.—A peculiar provision of Spanish law is that pharmacists are prohibited from advertising medicines or remedies in any papers but journals of medicine, surgery or pharmacy.

FUNCTIONAL TESTS OF HEARING: SOME OF THE PRINCIPLES ON WHICH THEY ARE BASED.*

WILLIAM LINCOLN BALLENGER, M.D.

CHICAGO.

The object of this paper is to call attention to the value of some of the functional tests of hearing and to the principles on which they are based. Wm. H. Thompson has recently made the significant statement that a knowledge of diseases of the ear is of more value to the general practitioner than that of all the other special senses put together. This being true, a knowledge of the more accurate methods of diagnosis and prognosis becomes a question of prime importance. The functional tests of hearing are of greatest value in that large and oftentimes perplexing group of diseases of the non-suppurative type which affect the middle ear and labyrinth.

No one doing ear work can claim to be abreast of the times if he does not have an intimate and comprehensive knowledge of the principles underlying these tests. They are to the otologist what the ophthalmoscope is to the oculist, or the stethoscope is to the one skilled in diseases of the chest.

It has been a source of some surprise to me to hear otologists of good repute refer to the functional tests of hearing as being of very limited value for diagnostic purposes. I may be pardoned, therefore, for making the following remarks on this subject:

In order to place it more clearly before us for discussion I will first state the principles on which the tests are based.

First Major Principle.—The range of hearing in adults under 55 years of age is approximately 16 to 48,000 vibrations per second. After the fiftieth or fifty-fifth year the hearing for the upper tones is somewhat reduced, as has been shown by Zwaardemaker, Bezold and others. The very aged do not, as a rule, hear tones higher than 37,000 vibrations per second. This should be borne in mind, as the case might otherwise be mistaken for one with labyrinthine deafness.

Under the first major principle may be grouped two secondary principles which only serve the purpose of elaborating or elucidating it. They are as follows:

(a) Anything which disturbs the normal tension of the drumhead and ossicular chain will diminish or abolish the hearing for the two or three lower octaves.

(b) Any disease affecting the perception apparatus will diminish or abolish the hearing for the upper tones of the range of hearing.

Second Major Principle.—Hearing by bone conduction is approximately one-half as long as hearing by air conduction.

This rule is subject to considerable variation in normal ears, but for practical purposes in the study of these principles we do not need to make a closer analysis. The point to be borne in mind is that hearing by air conduction is longer than by bone conduction.

The second major principle may be still further elaborated or elucidated by two secondary principles, namely:

(c) Hearing by bone conduction is increased in those affections of the middle ear which disturb the normal tension existing between the drumhead and ossicular chain.

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