false bacillus is found shorter on serum, that it develops more abundantly in bouillon, and continues to grow at twenty to twenty-two, while the virulent one grows only slowly. The change in the reaction of the bouillon takes place less quickly in the pseudo-diphtheritic than in the diphtheritic. They sought for this pseudo-form in forty-five sound children, and found it in fifteen. They also found it in the throats of twenty-six children out of fifty-nine in a village where there was no diphtheria. It was always present in small numbers. The inoculation of this bacillus never produced fatal consequences; at the most, only a local œdema. They succeeded in various ways in diminishing the virulence of cultures of the virulent bacilli. The non-virulent organism thus produced compared fully with the pseudo-diphtheritic bacillus. These pseudo and non-virulent forms did not produce any toxins. In some cases, also, it was possible to increase the virulence of the organisms. The virulence was increased when the guinea-pig was inoculated with an active erysipelas culture at the same time. Neither the weakened bacillus nor the streptococcus alone could produce the death of the animal, but the mixed cultures could. Death took place with the phenomena of diphtheria, and the diphtheritic bacilli underwent an increase of virulence. The weight of evidence at present thus seems to show that the organisms are the same, differing only in virulence. Further work is necessary, however, before the question can be definitely settled.

RESULTS.

The results obtained from the study of this large number of cases are not as valuable as they would be if the clinical side was considered in connection with the bacteriological. It is probable, for example, that the mortality apparently due to staphylococci would be to a certain extent explained by a careful examination of the cases clinically. The relation of the operative cases to the bacteria present is also important. There would be great danger, however, of detracting from the value of the results as a whole, if too many factors were considered. It is unfortunate, also, that the fatal cases could not have been autopsied, as an accurate knowledge of the pathological and bacteriological conditions would be invaluable. It is extremely difficult, however, to obtain autopsies in Boston, and in no case more so than in that of a contagious disease. It is to be hoped, nevertheless, that they may be obtained in the future and this vast amount of material utilized, for here lies the field for conclusively demonstrating the results of the symbiosis of other forms of bacteria with the Klebs-Löffler bacillus.

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RECURRENT APPENDICITIS.¹

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THE subject of this paper is a young man, age twenty-three years, single, student. Born and lives in Cambridge. Family history negative. Has always been well until he had typhoid fever three years ago, from which he entirely recovered, but has been troubled with chronic constipation since.

His first attack of appendicitis was January 1, 1892, when he complained of pain across the lower part of the abdomen, not very acute, but with considerable soreness; bowels were constipated. He entered the Cambridge Hospital at this time, and the record of the examination showed him to be of fair nutrition, pale and nervous, tongue coated with a pasty white coat. There was general tenderness over the abdomen, but it was especially tender in the right and left iliac regions. No dulness on percussion except in hypogastrium, due to a distended bladder, for the relief of which the catheter was used. The treatment at this time consisted of morphia suppositories, sufficient to keep him comfortable, and flaxseed poultices over the abdomen.

January 2d, the record shows some resistance in the right iliac region, with considerable sensitiveness on superficial pressure. Bowels were flat. I will say here that our patient was extremely hyperæsthetic.

January 4th, the tenderness over the abdomen had considerably diminished. Area of dulness had decreased in the right iliac region. Bowels were moved by enema. As our patient continued to improve, the tenderness became more distinctly confined to the area of the appendix.

He was discharged well January 14, 1892, having been in the hospital thirteen days. After he left the hospital he improved gradually, and at the end of a few weeks he was able to resume his college work.

His next attack was February 14, 1893, a little over a year since the first. He had been feeling poorly for five days, due to constipation, for which he took compound licorice powder. On the 13th he went to an evening party, and on his return home began to vomit, and complained of considerable pain in the abdomen.

He entered the hospital February 16th, where the recorded examination showed much tenderness in the right iliac region. The point of extreme pain was just

¹ Read before the Cambridge Society for Medical Improvement.

below a line drawn from the anterior superior spine to the umbilicus; the tender area was about two inches long, and one and one-half inches wide, with the internal border about three-quarters of an inch to the right of the median line. His general and local condition constantly improved after entering the hospital, so that he was discharged on March 2d with only slight resistance in the right iliac region, but no dulness on percussion.

The third attack occurred April 14, 1893, an interval of a little over a month, and again after dancing at a party. He went to bed feeling perfectly well, but awoke early in the morning with severe pain in the bowels, most marked in the right iliac region. He entered the hospital on that same afternoon. Examination showed the bowels to be flat; on pressure, there was slight resistance over same area as described in previous attack, with the greatest tenderness confined to this region. Examination of urine showed it to be normal.

A consultation of the hospital staff was held at this time with reference to surgical interference, but it was decided to wait and advise operation during an interval between the attacks.

He steadily improved with a diminution of the resistance in the right iliac region and disappearance of the pain, and was discharged well March 22d.

Our patient gradually improved, but not wholly. He became very pale and anæmic, was extremely nervous and irritable, and was obliged to give up his college work. He was unable to take any immoderate exercise, on account of soreness and a feeling of stiffness in his right side; and if any one accidentally came in contact with him here, it would cause him considerable pain. His general condition became extremely erratic now. One day he felt perfectly well, and would indulge either in a day's work or amusement, for which he would pay the penalty on the next by being overcome with a sense of weariness and inability for any unusual exertion; in other words, he was reduced to the state of semi-invalidism, so much so that in the latter part of July, I urged him to take a journey into the country, to see what a change of air might do for his general condition. He had grown extremely nervous about himself, and was in constant fear of another attack.

On the 24th of July last, he went to New London, N. H.; and while there he indulged in considerable exercise — base-ball and riding (or rather jolting) over the New Hampshire roads, etc.

On the 26th of July he began to feel ill; and on the evening of that day he was seized with extreme pain in the right iliac region, and vomited considerably. They had no morphia to give him, and he suffered extreme agonies; the only relief he obtained was by frequent applications of hot poultices. In this way they brought him through the night, and until they were able to procure some morphia for him on the next morning.

I saw him in New London, July 28th, with a temperature of 102.5°, and pulse 120; he had not passed water for eighteen hours, and on his countenance was a very anxious expression. The abdomen was flat; in the right iliac region there was considerable dulness, with the tenderness well marked at McBurney's point; and the general condition was like that of his three previous attacks. By means of rest, poultices, and morphia sufficient to control his pain, we were

able to bring him home, August 3d, when he began to improve again to a certain extent.

About a week later, August 11th, after running for a train, he was seized with another attack, very slight, which confined him to his bed for four days only.

He was now tired of Damocles' sword, and readily acquiesced when relief was offered to him by surgical means.

He entered the Massachusetts General Hospital August 23, 1893. The operation was performed by Dr. A. T. Cabot, August 26th, the patient having been previously carefully prepared. On the day previous to the operation, he was allowed no solid food; his bowels were well moved with castor-oil; and an enema, with turpentine, was administered. On the morning of the operation he was thoroughly bathed, and an antiseptic poultice placed over the abdomen.

Operation. — Patient was anæsthetized, ether being used. An incision was made over McBurney's point, about four and one-half inches long, the general direction corresponding to the outer border of the rectus muscle. Passing the fingers into the peritoneal cavity, the appendix was found in a bed of very firm adhesions, attached to the anterior abdominal wall. Adhesions were separated with the fingers, and the appendix was liberated and brought up into view at the opening. The appendix was surrounded with adhesive inflammatory products, from which it was freed. Hæmorrhage from a small artery on the external surface of the appendix persisted, and the artery was tied. A silk ligature was now passed around the base of the appendix; a cuff of the peritoneal coat of the appendix was dissected back; the appendix was cut off; and the peritoneal cuff was stitched over the stump with silk. The stump was turned toward the right side of the abdominal cavity. The abdominal wound was brought together by means of six silk-worm-gut ligatures, which were passed through all the layers of the abdominal wall; the wound was sewed up tight, no drainage being used.

Macroscopic examination of the appendix showed it to be two and one-half inches long, with the walls somewhat thickened; at the end and on one side it was perforated, but the surrounding parts were protected by the inflammatory products. The lumen was pervious, and no concretion found. I have not received the report of the microscopic examination.

He made a good recovery from the ether, and made a progressive convalescence. His temperature was practically normal throughout; his bowels were moved August 28th with calomel and one seidlitz powder, and thereafter moved voluntarily. On account of the unusual length of the incision, the stitches were not removed until the twelfth day, when everything was found firmly united. He walked out from the hospital well, September 11th, sixteen days after the operation. Since leaving the hospital, he has steadily improved, both in weight and general condition. He has lost that nervous irritability to a great extent, and has regained his former ambition. He is now able to go in town every day, and do a day's work without any of the former fatigue. I saw him recently, and examination of the right iliac fossa revealed no tenderness or resistance whatever.

The particular etiology of appendicitis is still somewhat obscure, that is, we have no definite set of predisposing causes which we can be sure are the origin of the trouble. Some writers speak of constipation as

a *sine qua non*; others suppose that diarrhoea plays an important part; still others think that it is caused by the impaction of a foreign body; and Treves considers a short mesentery as an important etiological factor, and a consequent twisting of the appendix as a result of this.

Constipation seems rather coincident than etiological. In 209 cases analyzed by R. H. Fitz, only 38 had an antecedent history of constipation; while Talamon points out that the most obstinate cases of constipation are in women, and still appendicitis is four times as common in males as in females. Again, we have constipation the rule in people of advanced age; and we all know that the greatest number of cases of appendicitis occurs between the ages of fifteen and thirty years.

Treves says that faecal concretions are not commonly found; Matterstack found only nine cases in a series of 146. Talamon suggests that a considerable proportion of cases are caused by faecal concretions, those not being found at operation having possibly been forced back by the muscular contractions of the appendix, or if an abscess has formed with perforation, that the faecal concretion has become softened and disintegrated by the action of the pus.

I have been much interested in Dr. Talamon's theory as regards the predisposing cause. He suggests the existence of a membranous colitis, or intestinal atony, where the patient has uncomfortable, distressing pains in the bowels, irregular stools, sometimes mucoid and sometimes constipated, and that the faecal and mucoid matters are deposited in the cul-de-sacs of the mucosa and are dried, and under favorable conditions (for example, increased peristalsis) are forced into the lumen of the appendix. He considers this to be the primary cause in recurrent attacks, which causes a peri-appendicitis and consequent adhesive inflammation about the appendix which binds it at an acute angle to the caecum, as in the subject of this paper, where the appendix was bound down firmly to the anterior abdominal wall in such a manner that all fluids or solids were forced into the caecum against the action of gravity. It is very easy to see how the appendix may become distended with fluids under these conditions, and how congestion and ulceration may follow.

Dr. Cabot has noticed in almost all of his operations for recurrent appendicitis that the appendix was bound down by adhesions in such a manner as to twist the lumen of the appendix out of its proper relations.

Dr. W. T. Bull, in the *New York Medical Record* of March 18, 1893, describes twelve cases in which he also noticed the appendix sharply bent and fastened in that position by adhesions.

In some cases, the tip of the appendix had been imbedded in a small abscess-cavity, which remained latent only to light up and cause a recurrence at the slightest occasion.

Fitz states that attacks of indigestion and acts of violence, especially from lifting, jumping and pulling, are exciting causes in one-fifth of the cases. A local cause is found in more than three-fifths of all cases, for example, inspissated faecal matters, or the presence of a foreign body.

The question of the propriety of operating in the interval between the attacks is an open one, and must be considered in each individual case. Dr. Fitz, in his statistics, places the percentage of recurrence at 11 per cent. Dr. S. F. Dennis thinks that conservatism

should be used in operating, since only 11 per cent. of the cases are recurrent, and of these some end in resolution, or else the lumen of the appendix is ablated by chronic inflammation, and is reduced to a thickened fibrous cord. In some cases, he says, the perforation will cause an extra-peritoneal abscess; and in still others there will be a localized, circumscribed, intra-peritoneal abscess, which may empty itself by rupturing into the rectum, vagina, caecum or bladder; and that only a small percentage of dangerous cases would be left, and he thinks these might be operated on early in the next attack.

Treves first advised the operation in 1877, and considers that the following indications justify it: (1) If the attacks have been very numerous; (2) if the attacks are increasing in frequency and in severity; (3) if last attack has been so severe as to place the patient's life in considerable danger; (4) if the constant recurrences have reduced the patient to a condition of chronic invalidism, and has rendered him unfit for occupation; (5) if owing to persistence of certain local symptoms during the quiescent state, there is a probability of a collection of pus.

As regards the mortality of the operation. In a collection of 81 cases by Cabot, there has been only one death, which was due to sepsis, a mortality of about $1\frac{1}{2}$ per cent. Treves reports 14 cases operated upon, all of which made a sound recovery.

It seems to me that if an operation is inevitable, the sooner it is done the better, that is, before the patient has had too many recurrences; for then there is a liability that the adhesions are dense and firm, and very difficult of separation.

Some writers say that there is no necessity of alarm in recurrent attacks, for nature protects herself against general infection of the peritoneum by these very adhesions which are formed, and that general peritonitis is avoided. Still, Price has collected 30 cases of recurrent appendicitis, and 20 of these exploded into an abscess or general peritonitis before the third attack.

The operation during an interval seems a safer one than that during an acute attack, even if that is done early; for in the latter case you have no time to prepare your patient for an aseptic operation. The patient is in an extremely nervous condition, is fatigued from pain, his bowels are more or less distended, the site of the operation has been reddened or blistered by stimulating embrocations; so, as Cabot says, it is almost impossible to do an aseptic operation. And here I would reiterate Dr. Cabot's plea, that the general practitioner who has a case of appendicitis under his charge, should use antiseptic poultices, which will render an operation much safer if one has to be done in an emergency.

It is very much different in an interval between the attacks. You approach the patient under entirely different conditions; he has been prepared for the operation, both in body and in mind; his diet has been regulated; his bowels have been moved, and all flatus possible has been removed; and the field of operation has been made thoroughly aseptic.

The technique of the operation varies according to the individual taste of each operator. Dr. McBurney uses the cautery and ligature in all of his cases. Dr. Treves sews up all of his cases without drainage.

Dr. S. C. Gordon, in the *Boston Medical and Surgical Journal*, reports six cases with recovery. He believes that all cases can be carried through the acute

stage by means of salines and depletion, and that it is much safer to operate in an interval; he also sews up without drainage, even those in which he finds an abscess.

In conclusion, I would say that it does not seem to me possible to lay down any definite rules as to when the operation should be done, but that each case must be considered separately. It seems to me that if it were possible to carry a patient through the acute stage without operation it should be done, since the operation in the interval by a skilful surgeon carries with it such a small mortality, and the abdominal wound can be sewed up tight, therefore minimizing the danger of a subsequent hernia.

Clinical Department.

A CASE OF MALIGNANT ENDOCARDITIS.¹

BY WILLIAM E. FAY, M.D.

THE early recognition of malignant endocarditis is so often difficult to the clinician that I desire to read this case. It is with the hope that it may be suggestive of discussion which will elucidate the way of diagnosis.

The patient was an Irish waiting-maid of twenty-two. Of her family there is little knowledge. Measles in early childhood; joints swollen and painful, with rheumatic fever lasting one month at the age of twelve; catamenia beginning three years later, always regular; occasional headaches; and a futile operation to find a needle she thought lost in her foot, comprises the known previous history.

On June 22d last, she is reported as standing in a china-closet, during a thunder storm of unusual severity, attending to her duties. Suddenly she was unable to speak. She understood what was said to her. She knew the words she ought to say, but could not utter them. From her own statement she thought she was all right in every other way, because she could move her hands and feet, and see and hear and eat. She experienced a chill some time during the next two days, when she was placed in the Newport Hospital. In a few days more she began to be able to say a word or two. Sometimes she was unable to repeat a word just spoken. She gradually acquired increasing power of speech during the six weeks of her treatment there.

On August 5th she was transferred to the Carney Hospital, and admitted to the service of Dr. James J. Minot. She had partial aphasia and huskiness of voice. Pain in left side, under costal border. Temperature 102.5° F. in the evening, subnormal in morning. A trace of albumen with a few blood and vaginal epithelial cells found at this time soon disappeared. Urine otherwise unimportant. No error detected in reaction of pupils to light or accommodation, nor in the protrusion of tongue. No paralysis. Throat and lungs normal. Apex beat of heart seen in fifth interspace, inside the mammary line. Pulse full, regular, compressible. Systolic murmur quite loud at apex, propagated into axilla, heard posteriorly at border of left scapula, anteriorly lightly over præcordia to base. Pulmonic second sound increased. Splenic area considerably increased, but limits indefinite on account of extreme

tenderness at this time. No tenderness elsewhere. No extreme tympany. Skin sensations normal.

During the following two weeks her speech became pretty natural, except for a certain hesitancy. She had a daily rise of temperature in the afternoon with morning remissions between the extreme limits of 96.4° and 104.8°.

Ten grains of quinine given at height of fever, caused gradual diminution of temperature, tinnitus and headache. Eight grains daily in divided doses was not well borne. However, during administration of quinine the variance in limits of pyrexia was somewhat lessened. Examination for plasmodium malarie was negative in results.

The patient came under my observation, during the absence of Dr. Minot, in the second half of August. She presented an aspect of anxiety, pale, eyes becoming slightly sunken. Tongue clean. No cough. No dyspnoea. No hæmorrhages. No abdominal tenderness except over area of splenic dulness. This area extended from the sixth interspace to the costal limit, where during inspiration the edge could be dimly felt. Dull pain here was more or less constant. No rose spots or petechiæ. Urine and dejections normal. Heart's murmur unchanged. Baffled in diagnosis, I asked Dr. J. J. Thomas to see the case with me and examine the blood. He found the red to the white as 100 to 1. Red normal. White in excess. Hæmoglobin 50 per cent. A condition more often pertaining to chronic, and after some acute diseases, as malaria and pneumonia, not typhoid fever.

About September 1st a small red spot appeared just below the trochanter of right femur, extending two or three centimetres. A small abscess developed at the centre, with infiltrated, uneven edge. Somewhat painful. Yielded a drop of pus. Healed in three weeks, under antiseptic dressings. Through this month patient gained a little strength. Splenic pain diminished. She sat up. A week more, and she was again in bed. Morning remissions of temperature are a degree or two less, and the evening rise higher. Pain recurs in the region of spleen. Urine becomes smoky; amount diminished; specific gravity 1.023; sugar absent; large trace of albumen; hyalin, fine, granular, fibrinous blood and epithelial casts; free blood and epithelial cells. It is five weeks since the urine was normal. In another fortnight there is one-eighth per cent. albumen; casts more numerous, of both large and small diameter. The spleen continues to be felt. Oedema of face appears. Semi-comatose condition supervenes.

On November 20th patient dies.

This illness extended over 122 days. In reviewing the time, it seems to divide itself somewhat into different periods. First aphasia is prominent, whether due to functional or organic cause? The kidneys showed no evidence to signify a causal relation to embolus. The mitral valve seemed responsible for a heart murmur, but this was thought to be an old chronic injury from an attack of rheumatism in childhood, and incidental to this illness. There had been no trauma. It was difficult to distinguish whether the trouble was motor aphasia or hysterical aphonia. There was no mind-blindness nor mind-deafness; and if Broca's region was impaired, lesion must have been extremely limited to be without some loss of function in the face, arm, or leg. In favor of the functional causation seemed to be the onset of the trouble coincident with her alarm from thunder and lightning, which frightened

¹ Read before the Boston Society for Medical Observation, December 4, 1893.