THE INDICATIONS FOR EARLY LAPAROTOMY IN APPENDICITIS.

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THE title of this paper is one which a very few years ago, not more than four, would have excited the surprise and even the condemnation of many surgical and medical practitioners. The very fatal character of the disease formerly known as perforative inflammation of the vermiform appendix was thoroughly appreciated much longer ago than that, but this form of the disease was looked upon as a disease *sui generis*, as beginning with a distinct intent, and as terminating fatally. And it was not until 1886 that the cloudiness surrounding the peri-cœcal inflammations was largely dispelled by the remarkably clear and able paper read before the Association of American Physicians by Reginald Fitz of Boston. Since that time much attention has been paid to this subject both by surgeons and physicians, and I know of no surgical topic to which more frequent contributions have been made by surgeons from all parts of this country than that now recognized as inflammation of the vermiform appendix, or appendicitis. The pathology of the disease has been closely studied, and a vast amount of information in this field has been gathered together, the most valuable part of which has been only recently contributed by physicians and surgeons, who, embracing the opportunity afforded by early operations, have been able to study the pathological processes from their inception. We have learned to discard the terms typhlitis, perityphlitis, paratyphlitis, extra-peritoneal abscess of the right iliac fossa

and the like, except when we wish through the use of these terms to indicate a secondary or late process, but one originating almost without exception in an inflammation of the vermiform appendix. We have learned that there is no such disease as idiopathic peritonitis, and that, excluding the special causes of peritonitis, which exist in the female, the cause of the vast majority of cases of peritonitis is an inflammatory process originating in the appendix. We have learned that appendicitis is a disease of frequent occurrence, that it is responsible annually for a large number of deaths, and that none of the older methods of treatment afford the practitioner any actual control of the disease, although medical treatment, rest, and intelligent nursing are doubtless of great value in limiting the extent and shortening the duration of the milder attacks. But, lest I give a wrong impression, I must distinctly state here, that there are many cases of appendicitis of a mild character which rapidly convalesce under no other treatment than that just referred to, and that not a few severe cases eventually recover without other active aid. Nevertheless the mortality under conservative treatment remains large, much larger, I am firmly convinced, than any statistics can prove, for many fatal cases occur whose true origin has never been suspected, and some cases too, which pass through one attack successfully, and are so noted, come finally to a fatal attack at a distant period. I may mention as an illustration of the difficulty of collecting complete statistics of the mortality of the disease under discussion the following incident: Not long ago I met in consultation over a severe case of appendicitis, one with very unfavorable signs, a gentleman much older than myself and of very large experience. I advised an operation as urgently called for, and he entirely opposed the proposition. In explanation he added that although he had in his long and active practice "met with many such cases" *he had never known one to terminate fatally*. In a discussion recently taking place at a meeting of a Surgical Socity, one member referring to appendicitis, said, that although he had seen such cases for years, none had terminated in abscess or death and none had recurred. The statistics given by close observers justify one in concluding from such remarks as those just quoted, that

many fatal cases are certainly not recognized at all. Fitz, in his remarks made before the Association of American Physicians last year, gives the mortality as 26%. L. A. Stimson, in a paper read before the Surgical Society of New York, on October 8, of last year, gives the mortality as 25%, and these percentages are so trustworthy and are made up from such a large number of personal cases that they may fairly be used as a basis for discussion. It is not my purpose, however, to endeavor carefully to estimate the mortality from appendicitis, and I have referred to the above statistics only that I might impress the fact that in discussing the treatment of appendicitis we are discussing the treatment of a disease, which when all cases are treated conservatively, kills a great many people. While the diagnosis of an inflammation of the appendix is usually not difficult when a careful examination is made, and is often very easy, yet, I know of no localized disease which is capable of presenting such a variety of pathological processes. The real difficulty lies in estimating at an early period the probable behavior of each individual case, and yet, on such estimate on the part of the attendants will depend the line of treatment.

I must, therefore, dwell on the diagnosis of the disease and endeavor to weigh the value of each symptom. Abdominal pain of greater or less severity is usually the first sign of appendicitis, but valuable time is often lost by reason of the misleading character and position of the pain. It is, at first, often referred by the patient to the whole abdomen, frequently to the epigastrium alone, sometimes to the umbilical region, and only in about half the cases does it begin at once in the right iliac fossa. But after a few hours or a day, it becomes more and more evident that the chief seat of pain is in the iliac fossa and then the diagnosis is generally made. The *slight* character of the pain is sometimes seriously misleading, so that a diagnosis of mild enteritis, constipation or colic is sufficient to satisfy both physician and patient. In some cases a prodromal stage of abdominal discomfort lasting a week, or even longer, precedes real pain. I have found the *exact* locality where the greatest sensitiveness to pressure exists to be a valuable means of diagnosis, so that in every case of abdominal

pain, not otherwise satisfactorily explained, I make a careful search for it. In the first hours of an attack of appendicitis it is not enough to compress with the whole hand the region of the iliac fossa. Such pressure will often elicit no more complaint from the patient than pressure of a similar kind made at other parts of the abdomen. But if firm pressure is made with the finger-tip, and especially if the patient be made to cough while such pressure is being exerted, it is invariably easy to determine that the most sensitive point is a definite one in most cases. This point is very accurately in the adult from $1^1/_2$ to 2 inches inside of the right anterior superior spinous process of the ilium on a line drawn to the umbilicus. In children it is, in proportion to their size, so much less distant from the spinous process. Occasionally this most sensitive spot will be found a half inch or so nearer the pubes, and sometimes this sensitive area will be larger than usual, but from the first hours of the disease even up to the end of several days, this sign may be clearly made out in every case. No other acute disease presents this feature. The accuracy of this sign I have demonstrated in every case operated upon by me since I first made the observation. The point described corresponds very accurately in the living subject, to the base of the appendix, and for this reason the sign is clearly defined whether the appendix is long or short, or points up or down. Of course, in late stages of the disease this sign does not usually exist. My friend, Dr. Weir,[1] commenting upon this observation of mine as to the exact spot of extremest sensitiveness on finger-tip pressure, does not agree with me as to its value, and says: "Furthermore, I have myself found on examination of 18 healthy persons by the above test of McBurney, that in 4 of them decided evidence of tenderness existed without other history of appendical attacks." When we remember that in 300 autopsies made at random by Tofft, 36%, over one-third, revealed evidence of disease of the appendix, Dr. Weir's examination would seem to be a singular confirmation of the delicacy of the test. Four out of the 18 is below the average. With the initial pain some patients have a chill, and vomiting may be

[1]Philadelphia Med. News, March 1, 1890.

severe. In other cases both or either of these symptoms may be absent. Fever to some extent is soon present in all cases except the mildest, but it varies greatly in degree, some cases having a temperature on the first day of less than 100°, others rapidly reaching a temperature of 103.5°. Rigidity of the muscles on the right side is a very constant sign and one of value.

The extent of tympanites varies greatly and its degree does not measure the severity of the disease at the onset. It may be very decided during the first day in some moderate cases and even entirely absent in some of sudden perforation. This sign must depend for its existence largely on the state of the patient's bowels, the ease with which the intestine in a given individual is brought to a state of paresis, and on other causes. As a rule, rapidly increasing distension is a positively unfavorable sign. Tumor may or may not be appreciable during the first two days. Sometimes the enlarged inflamed appendix itself can be distinctly felt at a very early period. As a rule, with few exceptions, tumor can be detected by the end of the second or third day. In very mild cases it is absent. The tumor consists of the appendix alone, or of the appendix surrounded by thickened omentum or inflamed œdematous intestine. Within the tumor pus is frequently found but it is often absent. The percussion note is not necessarily dull. Tympanitic percussion may be noted, due to the fact that a portion of intestine full of gas lies over the tumor. Generally the patient complains if the right thigh is over extended, and he will object if he is asked to cough. Rectal examination at the onset is of no value. The pulse deserves careful examination. By its variation from the normal condition it often indicates the severity and the increase of the disease, as it always expresses the amount of constitutional disturbance.

But few signs, then are constantly present within the first 24 hours. The history of sudden onset, the point of greatest sensitiveness to pressure exactly localized over the situation of the base of the appendix, fever as shown by the thermometer and the pulse, and rigidity of the right abdominal muscles, are the most constant and valuable signs in making an early diagnosis. In very mild cases no sign may be present excepting that of sensitiveness at the point described.

The making of an early diagnosis is of the greatest importance in reference to treatment. When no diagnosis is made opiates are usually freely given to subdue pain, more or less intestinal paresis and distension result, and pain being obliterated the arrival at a correct diagnosis is postponed from day to day. I have been asked to see a number of cases treated in this manner, and in most of them the diagnosis had been made with difficulty. Of the use of the hypodermic needle as an aid to diagnosis I can only say that I think it should never be used. If it discovers pus it may still have done harm in finding its way to or from the pus, and if it does not discover pus, the negative evidence thus procured is of no value. What is the value of pain as a measure of the gravity of an individual case? If great intensity of pain always existed in grave cases or if great intensity of pain always marked a serious and advanced stage in the pathological process, we should have no difficulty in separating our cases into two classes, one consisting of the mild ones and another of the severe ones.

In illustration let me quote briefly two cases: One, a healthy young man, had been attended for two days by two extremely competent physicians. His pain had been so slight, his fever only 100°, and his other symptoms so mild, that no diagnosis had been reached. On the third day, without special aggravation of any symptom, he looked more ill and felt so. Nevertheless, when I visited him with the late Dr. Sands he had become already septic. Laparotomy was almost immediately done. The appendix was found much inflamed and partly gangrenous. It was perforated by a large concretion. No adhesions of the slightest kind existed, and the whole pelvis was full of foul pus. Another, also a healthy young man, had such severe pain that during the first twenty-four hours that his physicians gave him one and one-half grains of morphine, without securing complete relief. When I did a laparotomy on this patient I found an appendix with only moderate signs of inflammation on its interior, and absolutely no peritonitis. This appendix contained six fæcal concretions.

But subjective pain as described by the patient is one thing, and sensitiveness to pressure when a careful examination is made is another. The latter is the sign that is of value. Dur-

ing the first twelve hours many cases, destined to develop the disease to very different degrees, will behave very much alike. Some will continue to go about with little complaint, others will lie still because motion causes pain, and they are fairly comfortable when at rest. Others will have very great pain, with nausea, vomiting and complete disability from the first hour on. Some will have during this period a quite ordinary pulse of 80 to 90, and a normal or very slightly elevated temperature, while others, beginning with a chill, will have a full bounding pulse, a flushed face, and a temperature of 102°, or more, from the onset. Every one of these cases deserves the most careful attention. Why? Because every one of them has, so far as our present knowledge goes, the beginning of an inflammatory process within the peritoneal cavity, the full development of which not one of us can forecast at this stage. Within the second or third twelve hours the signs may become much more clear. For treatment these different cases should all be kept absolutely at rest. Vomiting, especially, should be controlled as completely as possible—if necessary, by total disuse of the stomach. Anodynes, when really necessary to procure immobility or a moderate amount of comfort, are indicated. Vomiting ceases soon, and the stomach can then bear light nourishment. Laxatives should be carefully avoided, and enemas as well, that all peristaltic action may be discouraged. As a local application over the cæcum and appendix, cold is by far the best. The India rubber cold coil is the best apparatus. Under this treatment, cases that have begun with very mild symptoms will usually, at the end of twenty-four hours, either become milder or cease to advance and one will be encouraged to continue the same plan, still being carefully on the lookout for the development of tumor containing pus, which may quietly form, although other signs are favorable. The more marked cases, those with fever of 101° or 102°, with decided sensitiveness to finger-tip pressure, and with a more rapid pulse, indicating more constitutional disturbance, may come to a standstill, or may show increased signs of progressing disease; and the cases that began with high fever, very great pain and frequent vomiting, will usually at the end of twenty-four hours begin to show abdominal dis-

tension, increasing distress, and many signs common to serious illness.

A class of cases which I have as yet purposely avoided describing is that generally described under the head of Perforative Inflammation of the Appendix.

I think a common misapprehension exists as to this class. When perforation of the appendix takes place suddenly at the very beginning, pain is usually for a while intense. Symptoms of shock more or less clearly defined exist, and these are rapidly followed by chill or fever, or both, by extended pain, vomiting and tympanites. Septic peritonitis is beginning, and the patient is often treated for "sudden peritonitis." But perforation of the appendix by concretion, foreign body or retained pus, may be quite late in its occurrence. If, before its occurrence, safe adhesions have formed about the appendix, the perforation will take place without special sign, and usually an abscess is formed. On the other hand, perforation may not occur at all and yet pus be rapidly formed. If limiting adhesions do not exist, or if the adhesions are incomplete or feeble, pus may flow over into the pelvis, and produce precisely the same sudden aggravation of symptoms, or even worse, as when the appendix is perforated at the beginning of the attack. On Friday, October 10, last, a boy, æt. 12, was seized with abdominal pains at noon. He went home from school, and was visited by Dr. A. M. Hurlbut, of Stamford, Conn., a most careful observer. The boy had slight pain only, with no fever, he was tender on pressure over the appendix, and the diagnosis of appendicitis was made by Dr. Hurlbut. After a quite comfortable night, the temperature was below 100° in the morning of the 11th, and remained at the same point that evening. The boy had been kept in bed and carefully watched, Dr. Hurlbut intending to send for me if signs of progressive disease appeared. At one o'clock on Sunday morning, the 12th, the boy woke with intense pain and vomiting, and was seen within an hour by Dr. Hurlbut, who found him pale, almost pulseless, very tender all over the epigastrium, and with a temperature by the mouth of only 98°. I reached Stamford by the first train, and as it was Sunday the first train was an afternoon one. At 3 P.M. the boy's tempera-

ture was 102.5°, and I did laparotomy. When the peritoneum was cut turbid serum in quantity poured out of the incision. The appendix was partly gangrenous, perforated by a fæcal concretion, and surrounded by an imperfect collapsed abscess wall. In the pelvis was more than a pint of purulent liquid, and intense septic peritonitis existed all over the lower half of the abdomen. It is certain that in this case the sudden pain and collapse at the thirty-seventh hour were caused by the rupture and overflow into the pelvis of a feebly protected abscess. I have quoted this case to show that, while perforative inflammation of the appendix is often spoken of as a disease beginning with marked signs of perforation and only to be treated with any hope of success by immediate operation, it may occur, and it often does so occur, as a somewhat later step in an attack commencing like a mild one. The rupture of an abscess into the peritoneal cavity at any period in the course of the appendicitis, causes the same symptoms and usually the same fatal result that the sudden early perforation of the appendix causes.

I have referred to the period of twenty-four hours as one at the end of which the character of an attack should be closely studied and a careful estimate of the probable behavior of the case should, if possible, be made. The character of some cases will be decided even before this time by the extreme severity of the onset. In these it will be evident almost from the first that perforation has already occurred, or that a considerable peritonitis has already begun. In the mildest cases at the end of twenty-four hours the symptoms will be diminishing slightly or will be at a standstill and the patient will clearly not be much ill. The more marked cases at the end of the same period will be a little worse. The tenderness on pressure will be more clearly defined, the temperature as high as, or higher than, it was a few hours before, the pulse will show increasing constitutional disturbance and a moderate tympanites may begin to be evident. And after this period the signs either of continued improvement or of increased disease will be constantly more clearly defined. Tumor may begin to be appreciable, tympanites will increase, and more especially will the examination with the tip of one finger re-

veal exquisite sensitiveness at the base of the appendix. Even among these cases of increasing severity not a few will, after a few days, begin to improve, the symptoms abate, even a considerable tumor gradually or quite suddenly disappear and the patient will have finished with one attack. Or, while the patient becomes more comfortable in general, the tumor increases in size, becomes very clearly marked, and an abscess rapidly develops within the peritoneal cavity it is true, but well limited by strong adhesions. Out of a number of cases, all beginning in a somewhat similar manner, at the end of a week some will have died from general peritonitis, supposing them all to have been treated conservatively, others will be well or on the road to recovery, and others again will be waiting for the surgeon to open the abscess, running the risk from hour to hour of serious accident. As Prof. Bridge says:[2] "The abscess, wherever it is, and however well it may appear to be surrounded by protecting plastic deposits, is a constant menace to life, as evidenced abundantly by its spontaneous opening into the abdominal cavity, the venous canals, the bladder and chest cavity, as well as externally, and into the intestinal canal."

If one may judge from the description of appendicitis which I have given, and this description is not so very different from that given by numerous writers, we have to deal with a disease presenting itself with a very unusual variety and irregularity of symptoms, not difficult to diagnosticate, however, if careful examination is made early, but the course of which it is practically impossible in almost all cases to prognosticate during the first twelve hours. Our difficulties are again increased not only by the large variety of pathological lesions belonging to the disease, but also by the very great difference in the length of time occupied by the disease in producing a complete lesion, for instance, perforation of the appendix in one case, from that occupied in producing the same lesion in another. In one case the completion of the process of perforation may occur within a few hours from the onset, in another perforation may not be complete up to the sixth day. All who have

[2]Transactions American Physicians, 1890, p. 31.

had practical experience with early operations for appendicitis will agree that we cannot in all cases at an early period of the disease, within the first two days, decide from signs and symptoms whether protecting adhesions are forming or have formed or not. To be positive in regard to many points of the utmost importance we must wait. If we wait long enough, say to the seventh, eighth or ninth day, many of these difficult questions will be solved, for one after another of our patients will have died, and one after another of our questions will have been answered. On the seventh, eighth or ninth day we shall be able to muster together a more or less dilapidated majority of our cases, who will have successfully passed through many dangers, and not a few of whom now await the knife to give them the first opportunity to start on the road to recovery, a road by no means devoid of risk. According to Fitz,[3] of 176 cases of perforative inflammation of the appendix, 60 died during the first five days, 46 during the first four days, and 28 during the first three days. On the second day alone 8 cases died. But this statement only represents the day of death.

In reference to treatment it is far more important for us to know *when that pathological process begins* which directly causes the deaths on the third, fourth and fifth days. This process is usually sepsis and it is safe to say that in very large majority of the cases dying within the first five days, the fatal sepsis, hopeless for medicine, and nearly hopeless for surgery, *begins before the end of the third day.* At what hour, if we expect to save almost all of our cases, the severe as well as the mild ones, must we decide how we will treat a given case? Naturally before the process has begun which will soon render the use of medicine a farce, and an operation little better than an autopsy. Should then all cases of appendicitis be operated upon on the *first* day so as to anticipate every danger? Certainly not. As our means of diagnosis are improved, and as the study in the dead house has been more carefully directed to the appendix, we have learned that the class of extremely mild cases of appendicitis is large. Within a year I have myself seen thir-

[3]Transactions of American Physicians, 1886, p. 126.

teen cases in which the diagnosis was clear and yet the attack so mild that no one would have thought of recommending an operation. Nevertheless, even in such cases, at the very commencement, during the first few hours of the attack, a decision cannot always be safely reached at the first visit. Each case must be carefully and frequently studied if we would avoid on the one hand the doing of unnecessary operations, and on the other hand, the discovery that our patient, who was comfortable in the evening, is on the following morning profoundly septic.

The earliest possible diagnosis and frequent examination of the patient may properly be demanded of every physician or surgeon who is called to attend a case of appendicitis. Clearly defined rules that will guide one safely in all instances in deciding when a case of appendicitis may be safely treated conservatively cannot be laid down. A general description, often applicable, is the best substitute that I can offer. The diagnosis having been made in a given case, the treatment already described as applicable to mild cases should be at once instituted; anodynes should be carefully avoided, or at least given so moderately as not to mask symptoms subsequently. If nausea disappears within twelve hours, if at the end of the same period tenderness on pressure has not increased, if the temperature remains normal, or has not risen to 100° in the mouth, if the pulse is not accelerated, or but very little, if the patient moves in bed with ease, one is justified in regarding such a case as probably a mild one destined soon to recover. If at the end of twelve hours more the same indications exist, or there is very little change, the chance of a favorable ending is still better. If, during the succeeding two days, no tumor has formed, the symptoms have all improved, or some have improved while others remain stationary, the case may be considered as practically safe, although complete rest should still be enjoined. A moderate enema may be safely given, and often with benefit. Within the week probably all symptoms of the disease, excepting perhaps a little tenderness on pressure, will have disappeared. In other cases one or several symptoms will be more marked. The temperature will from the beginning be higher, perhaps rapidly reach 102°, the pulse

will be quick and full and nausea considerable but these symptoms will not increase in severity and the general aspect of the patient will be so good at the end of 24 hours that conservative treatment is clearly indicated. In these latter cases a short interval of, say, twelve hours more, will usually develop signs of improvement, or of cessation of advance, or of advance of symptoms. If signs of improvement have appeared medical treatment will be continued. If symptoms have merely ceased to advance, the decision will be postponed to another visit to be made after a short interval, and the medical treatment will be meanwhile continued. But if the third alternative has arisen, if the symptoms have become more marked, then the question of immediate operation arises.

In all of these cases which, at the end of thirty-six hours from the beginning, show well-marked signs of increasing disease, the question of an operation should be deliberately and carefully discussed and in my opinion done. The operation to be discussed is the one of the removal by laparotomy of the diseased appendix, the exact condition of which is not known, but which may cause the death of the patient, either within a few hours, or within a few days, or perhaps at the end of a long period by recurrence of disease. These are the cases whose treatment deserves immediately the closest consideration. It is *not* best to wait for "strong evidence of perforation, abscess, or general peritonitis." It is *not* satisfactory to wait until the pulse becomes rapid and weak, and the respiration anxious. What are the signs of "impending perforation?" No one can name them. When we discover "spreading" peritonitis, peritonitis has already spread. If it has passed beyond the wall of an abscess then the abscess has already ruptured. If we wait for marked distension of the abdomen, we shall often find at operation a septic paresis of the gut, from which condition I have yet to see a single patient recover. Such indications as these are the very conditions we should endeavor to *anticipate*, if we wish to save almost all of our cases. By the end then of thirty-six hours, sometimes much earlier, the question of operation should be deliberately discussed by the physician in attendance and the surgeon who would be called on to operate, if operation were deemed necessary. Surely

the latter can aid in interpreting the indications for or against operation before the time when the former shall have exhausted his medical resources. As a rule, with but rare exceptions, the indications of advancing disease can be clearly made out by the end of thirty-six hours, provided that the diagnosis has been made early, and that several careful examinations have been made subsequently. Advancing disease with clear signs at this period should be operated upon.

To be sure, in following such a rule, we shall sometimes operate upon and remove the appendix from a patient who could have recovered without operation and without abscess. This will not often happen. If it does, we shall have at least, at the same time, cut off the appendix, and the opportunity for a recurrence of disease, perhaps in a very intense form, and under very unfavorable conditions.

Cases which require operation at any earlier period than this are those of very sudden perforation, sometimes with, sometimes without, premonitory signs. In these cases the intensity of the pain, its very sudden onset, the shock, the marked constitutional disturbance, all point the way to immediate operation. In some of these, however, shock, even collapse, may be so great, that one is forced to delay, to stimulate the patient, and await at least a beginning reaction. With the late operations this paper does not deal. They will continue to be numerous, and through our efforts not to be too hasty with surgery, we shall lose some cases by death, and we shall also allow abscess to form which we will open on the sixth, seventh and eighth day.

Such presentation of this subject as I have made very properly requires supporting evidence. The patient inquires, the physician inquires, and the surgeon asks himself, which is the greater of the two evils, the disease or the remedy? Not a great many years ago only one answer would have been made to this question. The removal of the appendix in an acute state of inflammation would probably have failed to save in a larger number of cases than the disease would have killed. To-day this is not so. The operation is undoubtedly a serious one, but the results of operation have improved vastly, while the disease shows no signs of mitigation. Not a little miscon-

ception exists in regard to the dangers of the operation. As affecting the mortality record of surgical interference all of those cases may be thrown out where surgery has been resorted to to save a patient from a general suppurative peritonitis, from septic paresis of the intestine and multiple abscess in the peritoneal cavity, although even in such cases surgery has sometimes been successful. But we know that these cases are nearly always hopeless, although we often only discover this fact when the abdomen is opened. We should not forget that in the beginning of the disease we usually have to deal with a patient who was perfectly well up to the first sudden pain. No exhaustion, no general sepsis, no debility through long abstinence from food, prolonged vomiting, exist as obstacles to our best efforts. Furthermore, most of our patients are young, and the majority males. According to Fitz,[4] in 228 cases of appendicitis 173 were below the age of 31 and 207 below the age of 41.

An important and encouraging fact that has not been often referred to is that although the apparent danger of causing infection of non-affected peritoneum in the course of an operation for the removal of a diseased appendix is very great, yet in reality experience has shown this not to be the case. In a considerable number of these operations done at an early period, I have found pus present in considerable quantity. Non-infected portions of peritoneum must necessarily in the course of such an operation come in contact with sponges, instruments and fingers, and yet infection of the general cavity from such a source has not occurred in a single instance. But I should be doing surgery a gross wrong were I to give the impression that I considered operations for the removal of the appendix lightly. It is a serious operation, often a very difficult one, one requiring general surgical skill, good assistance, and every antiseptic precaution, and I do not recommend the operation to one who has never even seen it done, nor do I recommend it when the requirements such as I have referred to are not attainable.

A few years ago I felt that we greatly needed actual demon-

[4]Trans. Amer. Physicians, 1886, p. 14.

stration through the results of operation, that the operation could be done by different individuals under varying conditions and with something like uniform success. If such evidence could be accumulated then we could answer the question in regard to the remedy and the disease in favor of the remedy. Such evidence has come to us from various quarters, from Sands, from L. A. Stimson, Weir, Bull, Morton, Senn, Treves, Hartley, Mynter, Dalton, and from many others. And many of these successful operations have been done when the conditions were not of the best, when the cases had been long delayed, for one reason or another not the fault of the surgeon. But I have not been able to analyze and present in proper form the numerous cases referred to, and I must be content with making here my personal contribution to this interesting subject of early laparotomy in appendicitis. By early laparotomy I mean operation before the pathological process has reached a very advanced stage. This cannot be measured by time. In some the rapidity of the process is very marked, in others very slow. Some patients ask for attendance on the first day, and some not until the third or fourth day. I include in my list of cases *all* of the cases treated by early operation in my hospital and private practice before general septic peritonitis had begun, before pus had flowed freely down into the pelvis, or before complete septic paresis of the intestines had set in. These conditions are frequently fatal even with operation, and I am sorry to say that I have had to operate upon a number of such, and without success, although in some of these the operation was done at an early period as regards time, but at a too late one so far as the development of the disease and the surgical indications were concerned.

In studying this subject of *early* laparotomy for appendicitis we must not admit into our statistics operations done at a late period when a well protected abscess, such as can be properly treated by Parker's incision, has formed. From such an abscess of course the appendix may in some cases be extracted. Some such cases I have seen reported as examples of laparotomy for removal of the appendix. The appendix in such cases will generally be taken care of by the process of sup-

puration, as is shown by the usual recovery of patients whose abscesses have been opened and the appendix never seen.

An early operation is an operation done at a time when the removal of an actually diseased appendix is capable of putting an end at once to an active disease which has already become clearly defined and which threatens life.

Of this class of cases I now present to you the results obtained in twenty-four instances. The first of these was operated upon in May, 1888, and the last one week ago, January, 1891.

These include all the cases of this class that I have operated upon up to the present time.

The cases I present are 24 in number; 21 were males and 3 were females; all were under 36 years of age. In all excepting one case the conditions were such that life was seriously threatened. In one case the conditions were such that life did not seem to be threatened by the attack for which operation was done, but the appendix was actively diseased, and a recurrence, if no operation had been done, would have been highly probable. The appendix was completely removed in all cases but two. In one partial removal was deemed sufficient, and in another removal was deemed unwise.

Recovery has occurred in every case excepting one.

Two cases are still under treatment, but are now absolutely safe from accident.

Six cases were operated upon on the second day; 14 on the third day; 2 on the fourth day; and 2 at the end of one week.

CASE I.—E. M. P., male, æt. 19, patient of Dr. F. M. Otis. Great rigidity of right abdominal muscles. Exquisite sensitiveness at point two inches inside of right anterior spinous process of ilium on a line drawn to the umbilicus. At this point small tumor to be felt Pulse rapid and full, temperature, 101°; general appearance excellent. Operation on May 21, 1888, 49 hours from the commencement of attack. Appendix tensely distended with half ounce of foul brown pus. Appendix removed at its base. Recovery without incident of any kind.

CASE II.—John S., æt. 10. Roosevelt Hospital August 19, 1889. Earliest symptoms one week previously. At operation, temperature, 103.4°; pulse, 110; nausea considerable; tender tumor; no tympanitis; small tumor found, consisting of small intestines, enclosing appendix

and a few drachms of pus. No other adhesions or peritonitis. Removal easy. Recovery rapid and complete.

CASE III.—W. K., male, æt. 16. Roosevelt Hospital, July 26, 1889. Abdomen slightly distended and tympanitic; temperature, 102°; pulse, 110; small, very tender tumor. Operation at 49th hour. Appendix 6¼ inches long, œdematous and much inflamed and thickened. Minute foci of pus scattered through its substance. No concretion and no perforation. No protecting deposits of any kind. Unbroken recovery without incident.

CASE IV.—Annie O., æt. 18. Roosevelt Hospital, May 30, 1888. History of previous attack 6 years ago. Tympanites great; small tumor to be felt; temperature, 100.4°; pulse, 100; respiration, 36. Operation on third day. Appendix found much enlarged, thickened and greatly discolored; a small cavity beneath the end of the appendix contained small quantity (less than one ounce) of pus. The appendix was perforated at its middle by a large fæcal concretion. Unbroken recovery.

CASE V.—Charles E. A., æt. 25. Roosevelt Hospital, September 2, 1889. Previous attack five months earlier. Operation on third day. Severe abdominal pain, nausea, vomiting, muscular rigidity; temperature, 102°; marked adhesions and thickened peritoneum from former attack. Appendix found with difficulty and removed. It was much inflamed, thickened and hardened; no pus. Easy and complete recovery; small skin abscess.

CASE VI.—Miss E. C., æt. 25, patient of Dr. W. T. Alexander. Prodromal stage of vague discomfort for two weeks. Severe pain and first disability June 19, 1889. Great abdominal pain, nausea; pulse, 100; temperature, 101°; patient excessively tender at site of appendix, and looked very ill. Operation at 24th or 25th hour; scarcely the slightest trace of adhesion; appendix completely gangrenous, and as large as one's middle finger. It was not perforated, but contained two large fæcal concretions; reddened small intestine lay above and below; two days of nausea and tympanites; after that unbroken recovery. This operation evidently just succeeded in preventing sepsis.

CASE VII.—Edgar C., æt. 21. Roosevelt Hospital, January 15, 1889. Initial chill and great pain; temperature, 101.6°; pulse and respiration about normal; right abdominal muscles rigid; very acute tenderness at usual point; no tumor. Operation at 48th hour. Appendix doubled on itself, much thickened and distorted, and containing a black semi-fluid material. It was not perforated; the whole wall of appendix gangrenous at one point, as far as the peritoneal coat. Unbroken and complete recovery.

CASE VIII.—C. G. McK., æt. 23. First attack two years ago; second attack six months ago; patient haggard and looked ill; an ill-defined tumor existed, and the abdomen was markedly distended. Operation delayed, contrary to advice, twelve hours. Operation October 19, 1889, about 52nd hour. Owing to the distended gut, the search for the appendix was extremely difficult. It was found flat, wide, hard and very firmly bound down in every direction by old adhesions from former attacks. About a drachm of foul pus was found beneath the centre of the appendix. The appendix could be only partially removed, owing to the dense adhesions. No symptoms were relieved. The temperature increased, tympanites became extreme, vomiting set in, and the patient died at the end of four days. My later experience convinces me that this patient died of sepsis, and that the tympanites was due to septic paresis of the intestine, a condition which had begun some time before the operation. Had an operation been done at the first attack probably no such difficulties as I encountered would have been met with.

CASE IX.—T. R. D., male, æt. 22. Roosevelt Hospital, July 4, 1890. Very severe abdominal pain before admission, also occasional vomiting. On admission, temperature, 99.6°; pulse, 102; severe pain in right iliac fossa; extreme tenderness at typical situation. Operation at about middle of third day. Some slight adhesions between intestinal folds. The appendix is found coiled on itself, very deeply placed, and containing several fæcal concretions. It was perforated in two places at its base, and beneath this portion was a small abscess. The appendix was ligated and totally removed. Recovery unbroken and complete.

CASE X.—Edgar C. B., æt. 21. Roosevelt Hospital, January 15, 1889. Severe general abdominal pain, followed by chill. Temperature, 101.6°; pulse and respiration good; general appearance excellent; characteristic extreme tenderness on pressure on base of appendix. Operation at 50th hour. Appendix found behind and inside of cœcum, and doubled on itself. Its removal was difficult. The mucous membrane was gangrenous, and at one point the gangrene involved the whole structure of the organ to the peritoneum. No concretion. Recovery unbroken and complete.

CASE XI.—T. H., male, æt. 23, patient of Dr. Chas. Hunter. Extreme and continued abdominal pain; temperature, 99°; pulse, good; points of extreme tenderness characteristic; considerable distension. Patient had received 1½ grains of morphine in 24 hours. Appendix found without difficulty. It was but little enlarged; peritoneum not in

the least inflamed; no adhesions. The appendix contained six small concretions. Recovery unbroken and complete.

CASE XII.—Charles H., æt. 26. Roosevelt Hospital, May 30, 1889. History of four attacks; severe abdominal pain, chill and vomiting; very tender tumor; temperature, 99.4°. Operation May 30, at end of one week from first symptoms. Appendix found firmly tied down by old adhesions. It was removed, and found to be soft, swollen and infiltrated throughout with small foci of pus. Recovery unbroken and complete.

CASE XIII.—John C., æt. 28. Roosevelt Hospital, March 22, 1890. Prodromal stage of nearly two weeks of slight pain and abdominal discomfort. On admission, great pain and tenderness on pressure at the usual characteristic point; small, deep, movable tumor; pulse, 90; temperature, 99°. Operation on third day. The appendix was with difficulty dissected away from adherent intestine. This operation opened a small abscess; only about two inches of appendix removed; some fever for two days after operation. Otherwise recovery unbroken, though slow.

CASE XIV.—S. T., male, æt. 15. Roosevelt Hospital, December 13, 1889. Pain and tenderness in right iliac fossa; extreme point of tenderness on pressure lower than usual; small tumor, no tympanites and no fever. Operation on fourth day. Appendix easily found and removed; no adhesions; much swollen and necrotic at distal extremity. Perforation nearly complete; no pus. Recovery unbroken and complete.

CASE XV.—Mary D., æt. 13. Roosevelt Hospital, December 23. Severe pain and nausea, with occasional remissions for three days; characteristic tenderness on pressure at usual point; small tumor to be felt. Operation on third day. No adhesions excepting at apex of appendix. This organ was much thickened and hard, and the mucous membrane swollen and pulpy. Recovery rapid and complete. This patient would probably have recovered under medical treatment.

CASE XVI.—C. E. A., male, æt. 25. Roosevelt Hospital, September 2, 1888. History of former attack six months ago; tells the story of a long-continued illness. Present attack began two days ago; severe abdominal pains, nausea. and high fever. On admission, tenderness all over right iliac fossa, and tense muscles; temperature, 102°. Operation on third day. A very difficult dissection, owing to old adhesions of an extensive character, ended in the discovery of the appendix at a deep point on the edge of the pelvis. It was short, thick and densely hard; no pus existed. Recovery a little troublesome, but complete in six weeks.

CASE XVII.—Wm. S., æt. 56. Roosevelt Hospital, November 19, 1889. Great abdominal pain; temperature not recorded; pulse quick and full; characteristic tenderness at usual point extreme; tympanites great; operation on the third day. Appendix found very deeply placed behind and inside of the caput coli. At its base was a small, very distinct abscess, containing about two drachms of pus. Intestine in and around the abscess free, and not adherent anywhere. The appendix was much broken down and imperfect; removal partial; recovery easy, but a long tedious fistula remained, which was not closed until June following, otherwise his health was perfect.

CASE XVIII.—E. P. L., male, æt. 21. Patient of Dr. Charles Scudder. Sudden onset of great abdominal pain; nausea very early; temperature 102°; pulse full and bounding; exquisite tenderness on pressure over base of appendix. Operation February 27, 1890, at about 48th hour. Appendix very large, gangrene throughout and soft and putrid; passed deeply down to and over edge of pelvis; no adhesions; marked inflations of intestines and the adjoining coils deeply reddened; no concretion; removal not difficult; unbroken recovery, rapid and complete. Only incident troublesome tympanites for three days.

CASE XIX.—Henry B., æt. 16. Patient of Drs. George S. Wheatlock and W. W. Hewlett. History of three previous attacks of severity; each occurred in a different country and on two occasions the temperature in attacks reached 104°. Fourth attack began at noon June 30, 1890. Very severe onset with pain and vomiting; high fever at once after chill. Operation at the 46th hour. Pulse 120; temperature 102.5°. Appendix short, hard and much altered; black at points, not perforated; respiration hurried.

Some old and very tough adhesions existed, but no recent ones. A wide open hollow by side of appendix held about two drachms of fœtid pus. If the boy had turned over in bed he would have poured this pus into the general cavity. Appendix completely removed, but with difficulty. Temperature continued high for two days. Constipation was troublesome, after that complete and easy recovery.

CASE XX.—E. S. H., male, æt. 35. Patient of Dr. F. Hewel. Sudden onset, but symptoms not intense; complete disability. Operation on the third day. Pulse moderate but feverish; temperature 101.5°; characteristic tenderness on pressure highly developed; small tumor; appendix much diseased, partly gangrenous and perforated very slightly by fæcal concretions, containing four bird shot. Very few binding adhesions; about one drachm of pus beside the appendix. Operation easy; recovery unbroken and complete.

CASE XXI.—W. W., male, æt. 23. Patient of Dr. B. C. McIntyre. History of serious attacks in the four years, each more severe than the last. Present attack began with epigastric pain, chill and vomiting, November 20, 1890. Operation at the end of the third day. Very ill look; small tumor; characteristic tenderness very marked. Temperature only 99 2°; small tumor very deep, behind and inside caput coli; fresh and old adhesions at this point only enclosing the appendix and the pus. The abscess was opened and the appendix recognized with the finger, but it was too much altered and bound down to justify removal. Recover easy and complete, excepting that a sinus is still open, otherwise health and comfort perfect.

CASE XXII.—A. B. O., male, æt. 35. Roosevelt Hospital, January 28, 1891. History of previous mild attack few months ago. Present attack began with sudden and severe pain in the right iliac fossa; this continued constantly. Operation middle of third day. Temperature 99.8°; pulse 80 and full; general look excellent; exquisite tenderness on pressure one-half inch below usual point; very small tumor to be felt. Appendix found doubled on itself, large, hard and much inflamed; it was quite concealed by recent plastic deposit; no pus; mucous membrane black and pulpy. Removal easy; convalescence perfect; still under treatment.

CASE XXIII.—C. O., male, æt 12. Roosevelt Hospital, January 1, 1891. Sudden onset; very great abdominal pain; vomiting; no chill. Operation middle of fourth day Characteristic tenderness very marked at usual situation, but over a larger area. Small tumor. Temperature 101.6°. Appendix found in small cavity formed by small intestine alone and containing a few drops of pus. Appendix bent upon itself and perforated by fæcal concretion Partly gangrenous; removal difficut but complete. On third day lobar pneumonia; convalescence good, however, and wound to-day nearly healed.

CASE XXIV.—G. B, male, æt. 16. Patient of Dr. S. A Spalding. Sudden attack; high fever and pulse; local signs very marked; general appearance excellent. Operation at 40th hour. Appendix much diseased, contained two large concretions; it was not perforated. Recovery rapid and complete.