A Clinical Lecture ON APPENDICITIS.

Delivered at the Medical Graduates' College and Polyclinic.

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GENTLEMEN,—Up to June 30th, 1902, I find that I had operated on 143 cases of appendicitis in the acute stage. These cases have been carefully tabulated, and in many instances the patients have been followed up years after, when it appeared desirable to obtain the history subsequent to operation. My remarks to-day are based upon the experience obtained from a study of this material.

The first of these operations was performed in December, 1891, a little more than ten years ago. Before that date I had not wittingly operated for this condition, and I had not seen more than a few swellings in the right iliac region, which at this time I can look back upon, in the light of further knowledge, and say were probably appendical in origin. This, despite the fact that during the period from 1880 to 1891 I was connected with the same hospital as now, and for four years of the time was resident, and therefore had every opportunity of examining any interesting or unusual cases. Does this imply a much greater incidence of the disease now, or merely its recognition, whereas it was formerly overlooked? Perhaps both explanations are applicable. Now that the signs and symptoms of appendicitis are so well defined and recognized, and the pathology of peritonitis in general has been so much more fully worked out, there can be no doubt the disease is often recognized when in earlier days it would have been overlooked; this is especially true of the acute fulminating cases in which the local manifestation of a tumour is very generally absent or is obscured. Giving due weight to this, I am yet inclined to believe the disease to be of more frequent occurrence than formerly. I know how fallacious general impressions may be, but my tentative belief has some justification in the records of our hospital. I went through the *post-mortem* books for the 20 years ending December, 1894, and found recorded 20 deaths clearly traceable to mischief in the vermiform appendix, with 2 others possibly due to the same part, making a total of 22 deaths in the period of 20 years. Evidently, therefore, disease of the vermiform appendix was recognized at this date. In the immediately succeeding period of seven years from January 1st, 1895, to the end of 1901, 41 deaths are to be found in the records due to appendical mischief; in other words, the deaths recorded per annum in the latter period are nearly six times as numerous as in the former. The more general and ready recognition of the disease causes many more cases to seek for relief at hospitals now who may not have done so in earlier years, yet this will hardly apply to the more severe cases which, if incompletely diagnosed as peritonitis, iliac phlegmon, or perityphilitis, without recognition of the part played by the appendix, were yet so ill that they were as likely to be admitted to hospital before 1895 as since. Making considerable allowance for the non-admission of the milder cases, there is still an enormous discrepancy in the mortality records of the General Hospital in the two periods. The *post-mortem* practice of the hospital has not varied since 1874; a special officer, the resident pathologist, has made the examinations and kept the records, and fortunately now, as formerly, nearly all the cases dying are submitted to section. It is not easy to offer any sufficient reason why appendicitis should be more common now than a few years ago. Bad teeth, feeble digestion and the bolting of imperfectly masticated food are increasingly common, and may be reasonably expected to have an influence in any disease arising from the digestive tract, and to many people the hurry of modern life brings constipation, as the action of the bowels is often a deliberate habit, and very easily deranged, but these factors are insufficient to explain any great increase.

In a considerable number of cases the attack of appendicitis can be directly attributed to unsuitable food—pork, mackerel, over-ripe or under-ripe fruit, uncooked vegetables. In some cases, not so numerous, chill from cold and wet plays an active part, but whether food or chill be the active excitant, they both seem to act by setting up catarrh of the colon, and

of course in any process involving the *caput coli* the vermiform appendix shares. Catarrh of the colon I believe to be a very common condition, causing many twinges and discomforts which fortunately do not all imply an attack of appendicitis. If, however, from constipation, a concretion lies in the appendix, or the lymphoid tissue in the body is easily stirred up into active inflammation, or there is any malposition of the appendix preventing its free mobility and evacuation, then we have conditions likely to result in appendicitis as a sequel to colic catarrh.

Of the part played by age and sex it is not necessary to say anything, but I should like to call attention to a certain family predisposition to this disease. I have personally operated for appendicitis upon a brother and sister in one family, upon two brothers and a cousin in another family, upon a boy whose brother had been operated upon by another surgeon, and upon a boy whose uncle had died of the disease, whilst I am acquainted with similar instances in the practice of my surgical friends. These cases are too numerous to be mere coincidences, and suggest either local anatomical conditions or special proclivity to the invasion of certain micro-organisms which favours the occurrence of the disease in certain families.

A few years ago an animated and at times rather acrimonious discussion occurred in the medical journals as to what constituted a stone in the bladder. At first sight it would have appeared as though agreement could be reached in a few words, but it was not so. An agreement as to what constitutes an attack of appendicitis would be even more difficult to arrive at if it is to include all cases from the very mildest to the most intense. What I may regard as probably a mild attack of the disease another surgeon may look at as a colitis or as due to something in the right ureter, etc., or the parts may be reversed. Certain it is that pains and discomforts in the right iliac region are very common, I believe much commoner than appendicitis. Equally certain is it that sharp but fleeting pains in the abdomen, not over the caecal region, are due to the appendix. A man, aged 32, whom I saw with wide-spread pelvic suppuration from a perforated appendix had never suffered from any illness before such as would lay him up, but for more than a year he had occasionally been seized with an acute pain in the region of the umbilicus which made him double himself over the back of a chair or similar object to get relief by pressure. There was no vomiting or other symptom, and in a few minutes the pain would pass off and the patient resume his work. The explanation of these pains was furnished, I believe, by a large, hard, faecal concretion which escaped from the appendix, for since the patient's recovery from operation two years ago he has been absolutely free from the old attacks of pain. If the definition of an attack of appendicitis is to be so elastic as to include this patient in his early attacks of pain, it would be meaningless; yet other similarly vague cases could be quoted which, as this, were undoubtedly due to mischief in the appendix, and which eventually came to the hands of the operating surgeon. I do not, therefore, intend to spread the meshes of my definition so as to include every case of the disease, but to describe it broadly as characterized by pain, which in the onset is often umbilical, though it may be right iliac, pelvic, or left iliac; this is usually associated with vomiting, elevation of temperature, considerable quickening of pulse, and the phenomena which attend a peritonitis, local and then perhaps spreading—namely, acute tenderness in a limited area with local muscular rigidity, perhaps both of them eventually extending until a greater part or the whole of the abdomen is involved. The essence of the whole thing is a peritonitis starting from an inflamed appendix, from which infective organisms are invading the peritoneum. The peritonitis may result merely in sufficient production of inflammatory lymph to enclose and mat the appendix to adjacent parts; it may result in the formation of matter well circumscribed by adhesion, but originating inside the peritoneum and forming an abscess, which as it enlarges may push forward to the anterior parietal layer of that membrane and become adherent there. Or the abscess may make its way backwards into the loin or in other directions, or it may burst into the general cavity of the peritoneum through the giving way of some of the enclosing adhesions. Or, from the first, the inflammatory products of the peritonitis are not well defined and limited by adhesions, but become diffused to a greater or less degree. Not infrequently, when the appendix lies in the pelvis or on its brim, a suppurative peritonitis results which involves

most of that cavity, reaching to the surface of the rectum and the bladder, thus giving rise to special symptoms. In other cases the wall of the appendix is perforated from the pressure of a concretion on its inflamed walls, or it becomes gangrenous from thrombosis of and pressure on its vessels, when, owing to the intensity of the infection or to the patient's low reparative power, adhesions fail to form and a rapidly widely-spreading peritonitis is initiated which may involve the lower abdomen and pelvis, being limited eventually by the transverse mesocolon, or it may involve the whole cavity. A similar dangerous condition occasionally results from the rupture of an abscess which, hitherto localized by adhesions, bursts into the general cavity through incautious movements on the part of the patient, from violent peristalsis induced by purgatives, or even from the manipulations of the doctor. These varying results of inflammation of the vermiform appendix must be divided into groups or classes for any useful purposes of study. A localized abscess and a case of diffused peritonitis vary so much in the intensity of their symptoms, in the urgency with which operation is required, and in their mortality that it would be absurd to present all my 143 cases together and speak of them as a single group. Any classification must be in a degree artificial, but the following appears to me to form a useful and practical subdivision.

TABLE I.

Class I. Diffuse peritonitis.—29 cases, 14 deaths, 15 recoveries.
Class II. Pelvic and adjacent peritonitis and suppuration.—34 cases, 7 deaths, 27 recoveries.
Class III. Localized non-adherent abscess.—49 cases, 2 deaths, 47 recoveries.
Class IV.—Localized "safe" or adherent abscess.—31 cases, 2 deaths, 29 recoveries.
Total number of cases, 143; deaths, 25; mortality, 17.5 per cent.

The mortality was brought about in most of the cases by sepsis, due to an extensive peritonitis; this was so in all the patients who died in Class I, and nearly all in Class II. In Class III one death resulted from suppression of urine on the sixth day in a man aged 42, who was known to be suffering from chronic Bright's disease. The other death was from sepsis, not from an extending peritonitis probably, but directly from the abscess and infection of the wound in a man prematurely senile. In Class IV one patient, a feeble man aged 60, died of exhaustion two days after operation; he was the subject of a large abscess which had formed in a very insidious manner. The other death in this group was the result of a rapidly spreading emphysematous gangrene extending from an abscess which found its way into the subcutaneous tissues of the anterior abdominal wall, and thence spread rapidly over the abdomen and thorax; the patient, a boy, had only been ill eight days.

It is unreasonable to speak of this death-rate of 17.5 per cent. as the mortality of the operation. All of these patients would in my opinion have died if the disease had been left to run its course unless some unforeseeable accident (such as the escape of the abscess by the bowel in the patient with Bright's disease) should have dispensed with the necessity for operation. Such a rare contingency as this cannot be waited for; and even if it happened recovery would by no means have been assured, as the appendix was stenosed and perforated and contained pus. The deaths were in the main due to delay in surgical interference. There was a time in the history of many of them when successful operation was possible, before the peritonitis became widely diffused. Perforation or gangrene of the appendix does not flood the peritoneal cavity suddenly with infective matter as may do a perforated gastric ulcer, partly because of the position of the appendix in a corner of the abdomen and also because of its limited fluid contents, hence there is a time after the onset symptoms, even in the very acute cases, when recovery may be brought about by surgical intervention, but this time may occasionally be measured by hours. A few exceptions to this are provided by cases in which an already existing abscess is ruptured into the peritoneum, overwhelming the serous membrane with a dose of septic material from which there is scarcely a chance of escape. I should like to emphasize how brief is the interval for successful interference in the fulminating form of appendicitis in children, for a study of my cases shows the death-rate amongst them to be distinctly higher than it is in older subjects.

Indiscriminate operation in appendicitis I am no advocate for: the safety and welfare of our patients lies, I believe, in judicious selection. If a patient can be carried safely through his attack he may never have another or any other may be prevented by the removal of the appendix in a quiet interval

with only very small risk to life. To operate in the acute stage is to run risk of sepsis, to expose the patient to a tedious convalescence, to leave him often with a weak and yielding scar and possibly with a sinus or even a faecal fistula. My own practice has been, when it seemed reasonable, to defer operation in the acute stage, and I have little to regret in the cases in which I have advocated delay though this course has often been advised with much anxiety. In any patient whom I am, by reason of time or distance, prevented seeing again at an early date, when in doubt as to the safety of leaving him I advocate operation as involving less risk than delay.

What are the conditions inside the abdomen which call for operation? The presence of a localized suppurative peritonitis shut off by adhesions, that is an abscess. Or, a peritonitis which is purulent or sero-purulent but not circumscribed by adhesions and in which the general and local signs indicate that the peritonitis is diffusing and the patient is becoming toxic from the products of inflammation. I do not emphasize the condition of the appendix itself as to whether it is perforated or not, gangrenous, stenosed, kinked or otherwise altered. Though one may often correctly conjecture what the state of the organ is, yet more often this cannot be done. The great point is to endeavour to picture to ourselves what is the condition around it which the changes in the appendix have given rise to and to determine whether operation is required for the safety of the patient or whether expectant treatment will carry him through.

To arrive at a correct conclusion, many considerations have to be weighed. When the patient is first seen it is generally impossible to foretell what course his attack will run. At the onset the pain may be so acute, the pulse so quick and feeble, and the general aspect of the patient so bad as to suggest the necessity for almost immediate operative interference. In three or four hours, however, there may be a marked change for the better; the pain has now become bearable, the patient is no longer writhing with it, his collapse is passing off, the pulse is twenty or thirty beats slower, and under these circumstances further time may safely be taken for observation. In a very few cases where a hitherto unrecognized purulent collection has ruptured or an appendix perforated without protective adhesions, the symptoms do not improve, and operation is required at the end of a few hours after the commencement of the pain. Such extreme urgency is rare, but it has fallen to my lot to operate occasionally under these circumstances, once five hours after diffusion of an abscess ruptured by the manipulations of the medical attendant, the patient recovering; once eight hours after rupture of an abscess by muscular effort, the patient, a doctor, having been walking about with mild symptoms of appendicitis for three days previously; in this case, unhappily, a fatal result supervened very rapidly. Two patients were operated upon respectively fifteen and eighteen hours after the onset pain, and both recovered; the appendix was acutely perforated in both, without protection; and in the first of the two both the right iliac fossa and the pelvis were flooded with pus. These fulminating cases are exceptional; in the majority of attacks, either the onset is less intense, or in a few hours there is some recession of symptoms, giving time for reflection. Another twelve hours or so may bring a further accession of pain, quick pulse, etc., such as may call for operative relief without further delay, but this again is exceptional. Or the onset symptoms may be of moderate severity, but continue without abatement, and at the end of two or three days operation is clearly called for. In the majority of cases, at the end of some hours there is improvement, which steadily continues and leads on to convalescence, the result happily attained I believe in more than half the patients attacked. In a certain percentage, however, convalescence will be checked, sometimes about the third day, but it may be as late as the seventh or eighth; there is a recrudescence of some symptoms, and fresh ones arrive, indicating the formation of a localized abscess. Here there is plenty of time for observation and diagnosis, and operation can be carried out at leisure. There is no royal time for operation, neither the first, second, or any other day; the time for intervention may be as soon as possible after the onset, or a few hours later, or at the end of a week, but this should be determined entirely by the progress of the disease. The safety of the patient requires repeated observation of his case in the early days of the attack, until it is clear what course the disease will run; I know of no condition which demands closer or more careful watching if preventable catastrophes are to be avoided.

With the pain of the onset the patient generally vomits,

and when the stomach is empty vomiting usually ceases. It may, however, not occur at all, and in a few cases it is persistent, but this in a great measure depends upon the management of the feeding. If the patient is allowed to take nourishment freely, even though it be in fluid form, vomiting may persist, but if mouth feeding is interdicted for a time vomiting almost always ceases. If it still persists when food is withheld, this is a pronounced indication for operative interference. Other symptoms will generally be in accord, but if they are not, their moderate intensity should not outweigh the warning conveyed by continued vomiting, and should not be allowed to stand in the way of operative measures.

On investigating the condition of the patient's abdomen the *tenderness* over the caecal region at first may be very intense but it is generally to be described by a less emphatic adjective. The position of the acme of tenderness varies to a considerable extent and cannot always be fixed at what is known as McBurney's point. It is unreasonable to expect that it would be so constantly located when we remember how the position of appendix varies. Even when the caecum is quite normal in its position the appendix may lie to its inner or to its outer side or beneath it. Again, the whole or part of the appendix may lie in the pelvis adjacent to bladder or rectum, or across the base of the sacrum, in the left iliac fossa, or in one of several other rare positions. These variations must be kept in mind not only because they vary the position of the tenderness, but because they will influence any operative measures undertaken. With the tenderness *muscular rigidity* is associated, often involving a fairly wide area of the lower part of the abdomen, but becoming more localized as the severe pain and tenderness of the onset subside. If this improvement does not occur it is an indication of peritonitis of some severity and extent underneath, and should be carefully watched: whilst, if the rigidity extends, it is generally a good reason for operation without much delay. Localized muscular rigidity is often mistaken for an inflammatory tumour. The truth is, in the early stages of an attack, the persistent contraction of muscle quite prevents palpation of anything underneath it, and only when the muscular rigidity is passing off can the inflammatory thickening of appendix, matted to adjacent parts, and perhaps surrounded by pus, be palpated as a *definite tumour*. In the more severe cases a well-defined tumour may never form. In such, on opening the abdomen, there is an absence of matting and infiltration, and the appendix is found unprotected by adhesions, perforated or gangrenous, and lying in some quantity of sero-purulent fluid. If eventually, perhaps at the end of three or four days, a well-defined mass can be palpated, its limits should be carefully observed and noted. Mere matting of parts around the appendix, infiltration of the parietal peritoneum, and perhaps of the adjacent layers of the abdominal wall, may produce a tumour of considerable dimensions, and must not be regarded as conclusive of the presence of pus; but if, despite rest and other appropriate treatment, the tumour increases in size, this is fairly positive indication of an abscess. Let me again remind you that the appendix is not always to be found in exactly the same place, and that any inflammatory tumour due to its disease may be found in other localities than the right iliac fossa; in the right loin, for instance; in the upper part of the pelvis, or perhaps in its lower part, and most easily palpated by rectum, vagina, or bimanually.

Percussion may tell one little or nothing as to the presence of any inflammatory condition, as the intestinal resonance may obscure a collection of fluid of some amount which the gut surrounds and envelops, but as a rule any considerable amount of fluid gives rise to some degree of dullness. Resonance may mislead, for it is occasionally due to free gas circumscribed in an abscess cavity, the resonance being misinterpreted as due to gas-containing intestine. In such a case other symptoms will probably be sufficiently conclusive of the presence of pus, and should be acted on despite the doubt which the presence of resonance rather than of dullness may not unnaturally raise.

Of all the signs which may guide us as to the necessity or otherwise of operation in the early stages of acute appendicitis, the *pulse* is the most valuable and reliable. In the main its rapidity will be the index rather than its quality. As peritonitis is the essential feature of the disease, it may cause some surprise if I do not refer to the hard, wiry pulse to which inflammations of the peritoneum are supposed to give rise. Hard and wiry are certainly not the terms to apply to the pulse in appendicitis; it is on the contrary soft and yielding. It is to its rate that attention will chiefly be directed.

When the onset pain is distracting the patient the pulse-beat may be 120 or 130 in the minute, but with a less intense seizure 20 or 30 beats slower is more to be expected. With diminution of the pain the pulse-rate falls from, say, 120 down to 90 or 96 at the end of six hours or so after the first seizure of pain. In other less intense cases about 100 will be the maximum quickening of the pulse, and it may soon become about 86 to 90. In the case of such improvement as I have just suggested, it is very probable that other symptoms will improve also, and there is ample time for watching the patient and deciding if operative intervention is necessary.

Should the quick pulse of the onset remain at 120 or higher for more than twelve hours, the case should be looked upon as a grave one, and unless there is some particular explanation of the rapidity, such as the very youthful age of the patient or his recent removal from one place to another, delay in operation is inadvisable. Quite as significant is a steady quickening of the pulse. I recall the case of a lady whose attack began with a rigor early one morning, her pulse then being noted as 90; all day there was a steady quickening, until fifteen hours later it was 132. Vomiting and pain had disappeared under the influence of morphine, and when I insisted forthwith on operation the patient was so comfortable as to ridicule the idea. My opinion was, however, submitted to, and the lower part of the abdomen was found flooded with pus. If a quick pulse—one of 110 or higher—were always present in the graver cases, it would be an enormous boon, the decision for operation or the reverse so much easier. Unfortunately, valuable as is the aid given by the rate of the pulse generally, in the exceptional cases it cannot be relied upon. Illustrating this point I may mention a case in hospital. The patient, a male aged 25, on the third day of his attack, had a pulse of 80 and a temperature of 98°, yet his right iliac fossa and pelvis contained a large quantity of pus, and the indication for operation lay in persistent vomiting despite careful feeding. Quite recently I have operated upon a boy aged 15, whose appendix was distended with pus, and was gangrenous; the distal end was attached by old adhesions to a portion of small intestine, and under the arch thus formed about a foot of ileum was sharply strangled. At the time of operation and for sixteen hours before, the pulse was barely 100 and the temperature scarcely higher than 99°, but, as in the last-mentioned patient, vomiting was persistent. After the early days of the attack have passed, say the first week, and other indications have arisen which suggest the presence of a localized abscess, the pulse-rate will be of little assistance as a rule, for it will probably have fallen to something approximating to normal—to about 80, for instance. Such an improvement in the pulse must not for a moment be allowed to counterbalance the positive signs gained by palpation, the thermometer, or by other methods of examination.

The *temperature* is an uncertain guide in appendicitis, but not one by any means to be despised. We are so accustomed in suppurations generally to find an increase in temperature that many men still fail to realize how comparatively common it is to find pus in the abdomen, with scarcely any, or perhaps no, elevation of temperature. If the observer is once really convinced of this, the occasional eccentricities of temperature he meets with will not be likely to seriously mislead him. At the onset the temperature is almost always raised; it may in the first twelve hours or so reach to 102° or 103°, but more often it is a degree or two less. If the attack is a severe one the temperature remains considerably raised as a rule; and should this continue for three or four days, relief by operation is called for, whatever may be the associated symptoms. In exceptional cases, with severe peritonitis, the temperature is normal or subnormal, and if we have the paradox of a falling temperature and an increasing pulse, the former should be disregarded, and the latter should be our guide to the patient's condition. In the general improvement which occurs in a large proportion of cases attacked the temperature shares, and at the end of three or four days it may be normal. As I have already pointed out, an accession of symptoms at this time is by no means rare, suggesting the formation of a localized abscess, and one of the most positive indications is a fresh increase of temperature at night with a morning remission, the hectic chart with which we are so familiar in suppurations. It is, however, necessary to keep constantly in mind the possible absence of fever when pus is present and to give the fullest weight to other signs of abscess some of which will be present, namely, a tumour which can be palpated and which tends to increase, persistent pain and tenderness, the earthy anaemic unhealthy appearance of the

patient, and last, but by no means least in importance, the condition of his leucocytic count.

The value of the *leucocyte count* in appendicitis is undoubtedly considerable, but it is not an infallible guide any more than any other sign. The examination for leucocytosis can be made by any practitioner who will take the small amount of trouble necessary to acquire a knowledge of the method. The degree of leucocytosis is an uncertain guide to the amount of pus present. I have seen a count of only 17,000 in the presence of an abscess forming fairly rapidly and containing more than a pint of pus, and, on the other hand, a count of 25,000 with an abscess containing only a couple of drachms of pus, but, speaking generally, the more widespread and intense the infection the greater the leucocytosis. As I have already mentioned, the number of leucocytes present in the blood is not an infallible guide, for, in a few exceptional cases there is no leucocytosis when pus is present, but a negative result should not be accepted until more than one examination has been made. If time and circumstances permit, an examination should be made on three consecutive days to determine not only whether there is a leucocytosis, but whether it is rising or falling, if the latter, this may justify delay in operation. In the estimation of the leucocytes, as in so many other signs which affect the diagnosis, a positive result is more valuable than a negative, for whilst the latter may be misleading, in none of my cases has a positive result been obtained without the presence of pus.

Constipation is the rule in appendicitis, but *diarrhoea* may take its place and indicates usually a severe attack, but one in which happily the peristalsis of the bowel is still active, therefore diarrhoea is on the whole of good prognosis. It is, I think, specially likely to be present when the pelvis is chiefly involved in the peritonitis. There is a distinct group of cases which are best designated by the term "*pelvic appendicular peritonitis*," in which diarrhoea or rectal tenesmus and free discharge of mucus is to be expected. Here there is a degree of proctitis, the mucous membrane of the rectum is swollen and oedematous, its roof is often much thickened and infiltrated, whilst a defined tumour is sometimes to be found, it may be as large as the fist, indicating the presence of an abscess close to the rectal wall. In such cases the bladder is likely also to be troubled, micturition may be frequent and painful, or retention may arise. These symptoms are mostly due to inflammation of the peritoneum covering the organ, but in a few there is a degree of cystitis due probably to extension of the inflammatory process through the bladder walls. These rectal and bladder symptoms should receive careful attention as indicating the severity of the illness, the need as a rule for operation, and the locality involved, for this in its turn may materially influence the operative measures required.

In summing up the considerations which determine the necessity or otherwise for operation, I would say, be guided always by the severity of those symptoms present, ignore the absence of symptoms usually present, or their slight intensity if they are present. If a patient does not vomit, and if his temperature is approximately normal while the pulse is 120 and the abdomen very rigid, lay stress on these last two signs, and pay little heed to the others; or, again, if the pulse is but moderately quick, and the temperature is in correspondence, yet the patient continues to vomit despite the prohibition of mouth feeding, too great emphasis can hardly be placed on the last symptom. If the temperature is falling and the pulse at the same time quickening, whatever the state of the other symptoms, the pulse will be the index to the condition inside the patient's abdomen.

The necessity for operation having arisen the details by which relief is to be given have next to be considered. The position of the incision is not always the same, but should vary according to the site of the inflammatory focus. It will generally be made over the right iliac fossa about an inch external to the semilunar line, and will vary in length from 3 in. to 5 in., according to the depth of the abdominal wall. I always divide the deeper muscles instead of attempting merely to separate their fibres in a direction transverse to the skin incision. Whatever the advantage of the gridiron incision in the quiet interval operations, in the acute state too little room is obtained, and the parts are so infiltrated as to be easily torn and ragged. In a few cases the focus of disease will lie under the lower part of the right rectus, and the incision should be made through its sheath, separating the fibres of the muscle in their long axis.

When there is evidence of pus in the pelvis, incision in the middle line sometimes gives the most convenient access to it,

and through the same opening the vermiform appendix may be found and removed. Or the right iliac incision may be supplemented by one in the middle line when through the former the pelvis is found to be extensively involved, and a thorough clearing out of purulent pockets is required. When the focus of disease presents in the loin it may be attacked there rather than by an anterior incision, though perhaps more often it is convenient to incise in front, and, having removed the pus—and the appendix if this seems feasible—to close the anterior incision and drain through the loin. In a limited number of cases in which the pelvis is involved, the abscess may with advantage be opened in the rectum or vagina, but the operator should be quite sure that only the rectal wall intervenes between him and the pus, or he may open small intestine or bladder. When operation is undertaken for a diffuse lesion the position of the incision is not of so much importance, but when a localized abscess has to be dealt with it is a sound rule to incise as directly as possible on to it, evacuating the pus as directly as possible, thus avoiding the risk of diffusing infection.

Operation.—When the incision has been made, indeed whilst it is being made, if the attack has lasted several days and a well-defined tumour mass can be recognized, pus will probably well up into the wound, and there has been no evident opening of the abdominal cavity. The condition is one of "*safe*" abscess; pus has formed in the neighbourhood of the appendix, adhesions have circumscribed it; as the pus increased in amount the abscess wall has pushed forward, become adherent to the abdominal wall, and if the incision is directly on to the most prominent part of the swelling, the pus is let out as safely as possible. The finger passes into the abscess cavity and feels its lining of soft granulation tissue; cautiously searching about the appendix may now be recognized, generally matted to other parts, and perhaps perforated or partially ulcerated through. In a large majority of cases of this kind, however, the appendix cannot be detected by touch and should not be sought for further. If it is, persistent oozing of blood from soft granulations lining the cavity obscures things very much, and the search may be difficult and prolonged, leading to breaking down of adhesions and fresh infection; the softened and infiltrated bowel wall may be torn and a faecal fistula formed. Against this conservative course the possibility of recurrence may be urged if the appendix is not removed; but recurrence is quite uncommon, and in 25 patients from whom the appendix was not removed only in one has there been recurrence. In many abscesses of this kind a faecal concretion may be found, and such should always be carefully felt for, as, if overlooked, it may cause a sinus eventually. The abscess cavity is now lightly sponged out, and may be treated either by gauze packing or merely by draining and by suturing of the wound as closely as circumstances permit.

Instead of an adherent abscess it may be found as the incision is deepened that the general cavity of the abdomen is opened. As soon as this happens sponges, or any substitute used, should be packed all round any localized swelling to protect the peritoneal cavity from soiling. Only when this has been done should the fingers carefully and without violence begin to strip the adherent parts from the place where the pus is believed to lie. When the pus is located in the iliac fossa or behind the ascending colon it should be approached from the outer side, the large intestine being pushed inwards, and as soon as the abscess is tapped the pus should be quickly sponged out and it should be prevented by the fingers from gushing out in large quantities and so deluging the belly cavity. If the pus is located elsewhere it should be approached in whatever direction the adhesions are found to strip most easily and with every precaution to prevent it from soiling adjacent parts. The abscess cavity having been emptied the finger seeks carefully for the appendix or any faecal concretions as in the case of the "*safe*" abscess and if found these should be removed. In the cases at present under consideration greater freedom is allowable in the search for the appendix, for in contrast to the "*safe*" abscesses the peritoneal cavity is already open to possible infection and the operator can now see what he is doing and can take a definite guide to the base of the appendix in one of the longitudinal bands on the caecum, but even in these cases prolonged or extensive search is in my experience to be deprecated. If the appendix is not removed recurrence is quite uncommon, for in 25 of my cases in which it was not removed in only 1 was there recurrence.

It may be asked, If in some abscesses relief by operation involves opening the general peritoneal cavity, with its

attendant risk of infection, why not wait until the abscess has come forward and become adherent or "safe?" The answer is, We do not know in which direction any abscess may be progressing; it may be forwards to the surface, but, on the contrary, it may be in one of several other directions, producing destruction of tissue, with the attendant risk of secondary involvement of other parts, as the pleura or the portal veins, or perhaps eventually rupturing into the general cavity. Risks such as these should not be run when early operation affords so safe a method of escape.

If, when the abdomen is open, instead of a localized abscess we find a *diffuse condition*—sero-purulent fluid or thick pus lying amongst the intestines and omentum—it must not be inferred that there is necessarily a general peritonitis present. In a considerable number of cases the pus, though not bounded by such adhesions as would justify one in speaking of it as an abscess, is yet far from being distributed all over the abdomen; it may be limited to the pelvis, to the pelvis and right iliac fossa, or to the right iliac and umbilical regions. Inspection and careful exploration with the fingers will generally determine if this is so. If the inflammatory process appears to be limited, every care should be taken not to infect adjacent areas. The fingers should move gently amongst the intestines in search for pockets of pus—this especially in the pelvis—but with the intention, if possible, of sparing any circumscribing adhesions, however imperfect. In this way and by gentle sponging the parts involved are cleaned. The vermiform appendix is next sought and removed, if this can be done without great disturbance of parts or undue prolongation of the anaesthetic, for many patients bear this badly. As will be seen from Table II of cases presented, I have removed the appendix more freely in this group than in those of abscesses; indeed, I may put the matter in this way: the more diffuse the lesion the more often the appendix has been removed—partly because it was more easily found and partly because there was practically no added risk of spreading infection.

In this condition, as in the case of widespread peritonitis, a second incision in the middle line of the abdomen may be needed for purposes of cleansing and draining. If it is called for, the bladder should always first be emptied with the catheter, and even then careful watch made against damaging the walls of the organ, which often is fixed unusually high up.

If, instead of a peritonitis limited to the pelvis or quite the lower part of the abdomen, we have to deal with one which is *widely diffused*, we should act much as in the last group considered, though we may, instead of cleansing by sponges, use hot saline irrigation freely, but evisceration to aid in this purpose is rarely to be recommended, the shock it induces in these patients is more than they can bear. If the appendix can be removed without prolonged search, this should be done, but if it is left recurrence is quite exceptional, for it has only happened in 1 case out of 7, as the table shows. In the diffuse cases, whether a moderate or an extensive area is involved, drainage is always necessary, either by means of Mikulicz gauze packing or by drainage tubes inserted perhaps in two or three directions.

In a few cases drainage may be either by rectum or vagina, either in addition to that provided through the abdominal incision, or as a primary means of treatment. If the latter the evidence of pus presenting into one of the cavities should be clear, either there should be definite fluctuation or a soft yielding boggy patch in the middle of an area of oedema and infiltration in the wall of either rectum or vagina.

TABLE II.

Class I. Diffuse peritonitis.—29 cases—vermiform appendix not removed in 12, 7 survivals, 1 recurrence.
Class II. Pelvic peritonitis and suppuration.—34 cases—vermiform appendix not removed in 22, 15 survivals, 2 recurrences.
Class III. Localized non-adherent abscess.—49 cases—vermiform appendix not removed in 26, 25 survivals, 1 recurrence.
Class IV. Safe or adherent abscess.—31 cases—vermiform appendix not removed in 27, 25 survivals, 1 recurrence.
A total of 5 recurrences in 72 patients who survived. Two hospital cases cannot be traced.

My observations have already so encroached upon your time that I hardly dare trespass upon your patience further, but I should like to emphasize one point in the general treatment of these cases. On the use of opium in appendicitis there has been during the last few years a concurrence of opinion which it is difficult to disregard. It has to be given to relieve the severe pain often present at the onset and no one will gainsay the necessity. It is the repeated and persistent use of it which is so strongly to be deprecated. If the patient continues in severe pain which the first reasonable dose of opium

or morphine does not relieve the medical adviser should give a second with hesitation, and any more with still greater doubt as to the wisdom of his course. He may soothe his patient and comfort the friends, but he will run the risk of seriously misreading his case and of leaving a dangerous condition to progress beyond the reach of surgical measures. Severe and persistent pain should not be the occasion for repeated doses of sedative but for early operative interference.

REMARKS ON A SECOND SERIES OF FIFTY CASES OF RECURRENT APPENDICITIS TREATED BY OPERATION.*

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THE following remarks are based upon a consideration of a second series of 50 cases of recurrent appendicitis treated by operation which have recently been completed. Details of the first series of 50 cases were published in the BRITISH MEDICAL JOURNAL, December 22nd, 1900, p. 1763.

Sex.

Of the 50 patients, 39 were males and 11 were females, it being a well-established fact that the former sex are the most liable to this affection.

Age.

Twenty-three of the cases, or not quite one half, occurred in persons between 20 and 30 years of age, the third decade of life being the period during which recurrent appendicitis is most common. In 14 cases the patients were between 10 and 20 years of age. In two instances the patients were 10 years old, this being the youngest age at which the affection was met with. Though acute suppurative appendicitis is common in younger subjects, it would appear that when an attack of appendicitis in a child subsides without suppuration, there is less probability of the attack recurring in children if they are under 10 years than if they are over that age. Ten cases occurred in persons between 30 and 40, 2 cases between 40 and 50, and only 1 case in a subject over 50 years, the patient in this instance being 53 years of age. In 115 cases of recurrent appendicitis operated upon up to the present time, in no instance has the patient been under 10 years of age; in only one case (namely, that just mentioned) has the age of the patient exceeded 50 years, the liability to this affection decreasing as age advances. Several instances of acute suppurative appendicitis in much older subjects have, however, come under my notice, for in 3 cases the patients were respectively aged 61, 65, 76 years.

Number of Attacks.

In 5 cases there had been only one distinct attack, but the patients had subsequently suffered from what might be termed "reminders" of its occurrence, namely, frequent pain, or a sense ofaching after any exertion, sometimes attended by a local tenderness in the region of the appendix; in all these cases marked changes were found in the appendix, a concretion being present in one instance, so that there would certainly have been a recurrence of the attacks if it had not been removed. In 10 cases there had been two well-marked attacks, and in the remaining 35 cases three or more attacks. In several instances the attacks had been so numerous that the patients had lost count of the number.

Condition of Appendix.

In almost every case the lumen of the appendix was either partially or completely occluded at some point in its course, sometimes close to its origin from the caecum, sometimes at its middle or distal third. Though in most cases the walls were thickened, in a few, where the appendix was distended with fluid, they were extremely thinned. In one case, where the distension was extreme and the fluid contents were clear and watery, the appendix was quite translucent. It was frequently kinked or bent on itself at a sharp angle, and fixed in this position by adhesions which were present in the majority of cases, often firmer and more extensive after a few than after numerous attacks.

Contents of Appendix.

In 3 cases collections of pus were found shut off in the distal portion of the appendix, which was dilated into a

* A communication to the Manchester Pathological Society.