THE BRADSHAW LECTURE ON THE SIGNS OF ACUTE PERITONEAL DISEASES.

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PERITONITIS is a word strictly anatomical, and relates to an affection of structure only. The structure affected is known by its ancient Greek name, peritoneum; the corresponding English term, the rim or rim of the belly, has gone out of use or is remembered by being found in old books, such, for instance, as the writings of those learned anatomists Robert Burton and Phineas Fletcher, contemporaries of Harvey.

THE HISTORY OF THE RECOGNITION OF PERITONITIS.

The peritoneal structure has functions no doubt, but they are so unimportant or so obscure, that, however much they be disordered or suspended, no signs peculiar to the consequent disease can be discerned. This is the reason why the ancients, whose nosology was founded almost wholly upon symptoms or disordered functions, knew nothing about peritonitis as a disease of the peritoneum. In other words, peritonitis was not recognised before morbid anatomy began to be studied; nay, not until morbid anatomy had been studied for many years. In Morgagni, and even in Matthew Baillie, there is little or nothing about peritonitis; indeed nothing about it under that name. Nor could anything be more natural than this state of opinion. When the abdomen was laid open in a fatal case of peritonitis, it was not the peritoneum, but the intestine, the stomach, the omentum, all highly inflamed, that caught the mind's eye of these early anatomists; nor did they inquire which portion of those viscera was inflamed first and foremost. Hence the nosologist, Sauvages, invented the terms gastritis, enteritis, mesenteritis, metritis, cystitis, to signify the inflammation of the respective organs as manifested by changes in their outer peritoneal tunic; and, from 1750 for many years onward, these words were much used, and always in the sense indicated. Sauvages invented the term peritonitis also, but he meant thereby inflammation of that part alone of the peritoneum which lines the abdominal walls and covers no viscus. No wonder that the word, while this was its meaning, was very seldom employed; no wonder that Cullen, who, in his *Nosology*, gives a place to peritonitis, excludes it from his *First Lines*, saying that the disease, when existing alone, is hardly to be recognised, and does not require any special treatment.

This state of morbid anatomy, this failure to recognise the unity of peritonitis, faithfully reflected the state of anatomy in general. The peritoneum was known as being the outer tunic of the stomach, intestines, and other abdominal viscera, but of the peritoneum as a uniform continuous structure, as a single organ, so to speak, anatomists, before the time of Bichat, had little or no notion.

The study of puerperal fever led the way to more modern opinions. That disease had been known for many centuries, but by its symptoms only; one of the best descriptions of it, written from this point of view, is to be found in the works of our distinguished Fellow, Thomas Willis. He, in all likelihood, never examined a case after death, and he therefore deemed the fever to consist wholly in an infection of the blood, not secondary to any local inflammation. It was not until the middle of the last century that it came to be known by many that the abdominal viscera, or rather their peritoneal surfaces, are inflamed in most cases of puerperal fever; and from this time onward one form at least of universal peritonitis was well known, but not known by the name of peritonitis; that term had been invented, but was never employed—a fact which is proved by a story which John Hunter used to tell in his lectures. He said: "A man whom I tapped

at the hospital died the third day. I said he died of the puerperal fever. This was smiled at in the hospital, and some were pleasant in remarking on the curiosity of a man being delivered; but a few months afterwards another having the same fate I convinced them, by dissection, that he had died of suppuration of the peritoneum, which we must admit to happen in puerperal fever."

A great change of opinion, and a conversion to the modern conception of the peritoneum, is marked by the publication of Bichat's treatise on membranes in 1800. Henceforth the peritoneum is deemed by all to be not many several portions but a single whole. Discoveries are seldom made at a bound, the sunrise is foretold by the daybreak; and there were those who, before Bichat, had perceived the unity of the peritoneum; I refer especially to James Douglas and Johann Gottlieb Walter. Bichat was more than an anatomist; he was a great morbid anatomist; he had attained to modern doctrine with respect to peritonitis also. But what his early death—a death too early—suffered Bichat not to write was written by his disciple Laennec, whose *Histories d'Inflammations du Péritoine*, published in 1803, were the first essay on peritonitis conceived in the modern spirit. And here I will bring my preliminary history of opinion to an end.

THE SIGNS AND SYMPTOMS OF PERITONITIS.

It is not my intention to speak of the morbid anatomy of peritonitis, nor of its causes, a topic which is becoming more and more one of microbes and morbid poisons, for peritonitis also has entered the great class of parasitic, zymotic, and virulent diseases. The changes which peritonitis begets in the living body is my theme. I am not so vain as to suppose that I can say anything which will be new to such an audience as this; all that I can pretend to do is to recall to your memories the facts of your own experience, and to arrange, criticise, and endeavour to explain those facts. *Ament memine periti.*

LOCAL SIGNS.

The chief local signs of acute peritonitis are three: pain, meteorism, and ileus; and to these I will, in the first place, direct your attention. But before I proceed I may remark that, with regard to the symptoms, both local and universal, of acute peritonitis, it would be possible to take the term "peritonitis" in the sense of any affection of the peritoneum, which is all that the word signifies, strictly speaking. The termination "itis" is a feminine adjectival suffix which has nothing to do with implying inflammation; peritonitis means no more than peritoneal, disease being understood. The symptoms of sudden inflammation of the peritoneum, of sudden hæmorrhage into the peritoneum, and of sudden perforation of the peritoneum, are essentially the same. However, I have not the slightest intention of using the word in any but its customary sense, and peritonitis shall mean, as it always has meant, inflammation of the peritoneum.

THE PAIN OF PERITONITIS.

Broussais speaks of pain as being the only pathognomonic sign of peritonitis. I fear it would be nearer the truth to say that there is no pathognomonic sign at all. Yet, however vague and uncertain a sign of disease pain may be, it often is, at the onset of peritonitis, our only guide to the locality of the affection, although an untrustworthy guide. The earlier physicians called the pain of peritonitis, colic; nor is it always easy, even in the present day, to distinguish colic from peritonitis. The symptoms associated with the pain do not always help. In some cases of mere colic (or intestinal pain), say lead colic, the abdomen is very tender to the touch, and the pain is not relieved, but is even increased, by firm pressure. Moreover, colic is sometimes a febrile disease; and for proof of this assertion I may again refer to lead colic; the temperature of some persons suffering from that disease will rise considerably, and remain for days above the rule of health. The colic of indigestion is sometimes indistinguishable from an attack of peritonitis, until the threatening symptoms pass away with a free action of the bowels.

THE PAIN OF MENSTRUATION.

But the most puzzling disorder of this kind which I have met with is the abdominal pain which sometimes accompanies the menses in young women. Pain, having all the characters

of colic, is common enough about the menstrual period, and causes no difficulty. Menstruation is not seldom a febrile process, and, when this is all, we know with what we have to do. But when abdominal pain and fever are associated, when they precede the appearance of the menses by two or three days; when the patient shivers once or twice, vomits, lies with her knees drawn up, and when her belly becomes swollen, how can we at first have any doubt that she is suffering from peritonitis? Yet no sooner do the menses occur than all these symptoms disappear, and then how can we any longer believe that her complaint has been peritonitis? Not only does colic simulate peritonitis, but the reverse also is sometimes true, that peritonitis, at the onset, cannot always be distinguished from colic. The diagnostic difficulty may be met with, for instance, in peritonitis due to sudden perforation of a hollow viscus, especially the stomach or duodenum. In such cases it often happens that the temperature of the body does not rise; and for some hours at least the pain has all the characters of colic pain, and there are no other signs distinctive.

THE PAIN OF COLIC.

But it may be that in contrasting thus the pain of peritonitis with the pain of colic we are seeking for a distinction where there is no real difference. Indeed, it is highly probable that the earlier physicians were often right, and that much of the spontaneous and paroxysmal pain of peritonitis is due to colic—that is to say, to vermicular contractions of the intestines much more powerful than usual. Surgeons tell us that when they open the abdomen in order to remove an ovary, the intestines are seen to be at first in very active movement; and that these movements may be painful as proved by what we sometimes observe in intestinal tympanites, when the peristaltic contractions of the bowels can be seen through the abdominal walls, each contraction being attended by an unnatural sensation or by actual pain. Moreover, surgeons say that they can handle, cut, and scratch the stomach or intestines of a man who is quite sensible and not cause in him any sensation of pain; but we cannot go so far as to affirm that an inflamed peritoneum may not be extremely sensitive to painful impressions.

TENDERNESSE.

As to tenderness upon pressure of the abdomen, is it not a mistake to suppose that it is pressure upon the peritoneum alone which brings forth the pain? The skin also is tender, and is sometimes tender to the gentlest touch. In bygone days I have attempted to shave the head of a patient suffering from acute meningitis, and have been compelled to desist on account of exquisite tenderness of the scalp. No question of pressure upon the membranes of the brain can arise under such conditions. Indeed, tenderness of the skin is apt to follow great pain of any underlying part. I have already remarked that simple colic may be accompanied by great tenderness on pressure. And I commend the consideration of these facts to those who find a difficulty in believing that leeches or blisters applied to the skin can possibly affect a deeply-seated part with which the skin has no obvious connection.

METEORISM.

Leaving the topic of pain, I now pass on to the other local signs of peritonitis, namely, meteorism and ileus. The pain is in great part intestinal, meteorism and ileus are wholly such. The pain is in great part due to intestinal spasm, meteorism and ileus are due to intestinal paralysis. The hollow viscera with muscular coats are the only viscera which are directly affected by the peritoneal inflammation, and this affection takes the form of spasm or paralysis. Patients with peritonitis are often unable to pass their water, whether from paralysis of the bladder or from inability to start the reflex act may be open to question; the latter is probably the more usual cause. But about the intestinal paralysis there can be no doubt. It manifests itself in its earlier and slighter degrees by meteorism or acute flatulent distension of the bowels. I do not speak of that peritoneal meteorism which is due to the escape of air into the peritoneal cavity in consequence of rupture of some part of the alimentary canal, but of that intestinal meteorism only which is secondary to peritonitis. Intestinal paralysis is no longer a matter of inference. Abdominal section nowadays

often gives surgeons the opportunity of seeing how intestines which, when first exposed, were in active movement, afterwards become exhausted, and lie limp and motionless. This intestinal paralysis is not continual or not universal, for in patients whose abdominal walls are thin, vermicular movements of the intestines, either spontaneous or produced by handling the belly, can be seen sometimes in spite of very great meteorism. But this is an exception to the rule. Usually no intestinal movements can be seen, and probably none occur, or else they are too weak to show themselves. So we may suppose that the flatulent distension is due partly to relaxation of the intestinal walls, and partly to weak peristaltic movement insufficient to pass the wind onwards, a condition closely resembling constipation. This torpid meteorism, I just remark in passing, may be attended by great and constant pain—a fact which seems to show that the pain of peritonitis is due not altogether to colic or painful intestinal contractions, but partly to the inflamed peritoneum itself. Another proof that the intestines are not so utterly paralysed as might at first seem likely, or that the large intestine at any rate escapes, is afforded by the fact that natural defæcation, or even diarrhoea, will accompany acute peritonitis. This was so in the epidemic disease which bereaved our College of a Fellow whose name no doubt remains in the memory of many here present; I refer to Dr. Francis Anstie. You will allow me briefly to repeat the story, which may not be known to all. Fifty-two girls in the Royal Patriotic School at Wandsworth were attacked within one week by a disease characterised by two main symptoms, namely, by lipothymia, with coldness and lividity of the face and limbs, and by great pain in the belly, which was tender also to the lightest touch. Four children died, and dissection of the bodies revealed peritonitis. One fatal case suffered from diarrhoea with rice-water stools, and was examined by Dr. Anstie. He pricked his finger, and died six days afterwards, poisoned, as if by a snake bite. A remarkably similar epidemic, which occurred in a charity school for girls at Edinburgh, called the Merchant's Hospital, is described by Abercrombie. Peritonitis by itself would probably always be attended by the constipation of paralysed intestine; and surgeons note great constipation in cases of peritonitis following abdominal section. When diarrhoea concurs modern doctrine would lead us to infer the coexistence of an infection of the intestinal mucous membrane, especially that of the colon.

ILEUS.

A higher degree of intestinal paralysis is marked by the state called ileus, a word which has been sufficiently constant in its meaning from the earliest times. It denotes disorder of an intestinal function, namely of the peristaltic function, and implies inability on the part of the intestine to propel its contents. The kind of ileus which concerns us here is that which is due to inflammation of the intestines, or enteritis. I have already remarked that the term enteritis originally meant an inflammation of the peritoneal coat of the bowels. It was Broussais who most unwarrantably perverted the meaning of the word, and who used it to signify an inflammation of the mucous membrane of the intestines, one out of many instances showing the degree to which corruption of our technical terms has been carried. They who continue to use the word enteritis in its original sense do no worse than follow the example of Pemberton, Abercrombie, Graves, and Watson. For those who desire a name to express inflammation of the intestinal mucous membrane, the terms *eso-enteritis*, *muco-enteritis*, *enteritis mucosa* have been invented.

The sign of ileus is vomiting becoming *fecal*. The father of physic has well described the course of events, the matters vomited being first mucous, afterwards bilious, and lastly *fecal*. Until the vomit become *fecal*, or at least *porraceous* (meaning thereby an appearance like chopped grass or spinach) it is impossible to affirm the existence of ileus. The concurrence of constipation is no help, and indeed, on the other hand, *fecal* vomiting may be attended by the evacuation of small loose stools, resembling in colour and other respects the pale, uniform, pasty intestinal contents found in cases of mechanical obstruction. I need not stay to bring proof that *stercoral* vomit may be due to obstruction in the ileum; and thus the question, formerly so much debated,

of possible reflux through the ileo-cæcal valve, loses its interest. Nor need I discuss the mechanism of faecal vomiting, or say more than that there is no evidence of inverted peristaltic movement of the intestines. If enemata ever become emetic, as Sydenham says they do, it can only be by absorption into the circulating blood, just as vomit may smell of turpentine after the use of that drug in a clyster.

SUMMARY OF LOCAL SIGNS.

So that pain and the signs of intestinal paralysis are the only local evidences of acute peritonitis. It were much to be wished that the disease afforded physical signs, such as are usually present in chronic peritonitis. Purulent discharge from the navel in acute peritonitis (just as in the chronic disease) indicates a circumscribed peritoneal abscess; in acute peritonitis the abscess is mostly connected with disease of the appendix vermiformis. I do not know that a suppuration of the whole peritoneum over points at the navel or elsewhere; a form of disease so virulent as this kills the patient before the collection of pus has time to point. We open these local abscesses freely, and with much success; but with regard to total peritoneal suppuration, I will adopt John Hunter's words without change: "How far in such cases it might appear desirable to make an opening into the abdomen, and throw in warm water repeatedly to wash away the matter, I will not undertake at present to determine."

GENERAL SYMPTOMS.

Fever.—Let us now pass on to consider the remote or universal effects of peritonitis. And first of fever. No symptom is more uncertain than this; the temperature being sometimes high, and reaching 105° or more; usually but moderately raised; whilst in other cases there may be no fever at all, so far at least as can be judged by a thermometer in the mouth or axilla. This apyrexia is a remarkable symptom when present, as it sometimes is, from first to last in peritonitis the most intense and fatal. We are tempted to speculate upon the cause of so strange a phenomenon; whether an ordinary febrile poison be not produced by the inflammation, or whether an extraordinary febrifuge poison be produced; at present we cannot do more than note the fact. Apyrexia sometimes becomes algidity; an important sign of the lipothymial state to which I shall soon refer.

Putridity.—More certainly due to an infection of the blood are the putrid or septicæmic symptoms which sometimes happen. When we bear in mind what Bichat pointed out, that the peritoneal cavity is a lymphatic sac, with a most extensive absorbing surface, and an extraordinary power of absorption, the wonder is that these symptoms do not occur oftener. I will illustrate this form of disease by the case of one of our students at St. Bartholomew's. He was running along the street, and got a heavy fall, which was the only discoverable cause for the acute peritonitis that occurred within forty-eight hours. Delirium and diarrhoea were associated with the abdominal pain and vomiting of the first few days. On the sixth day he complained chiefly of pain in his joints; his feet and one shoulder were swollen and excessively tender. The skin over the feet, wrists, and ankles was red in patches. His urine was highly albuminous, but no blood corpuscles or casts were found in the sediment. The diarrhoea continued; he lay in a state of typhomania—that is, of delirium with consciousness much impaired. He had a greater tendency to chills and occasional shivering than is usually met with in cases of peritonitis; the temperature varied between 102° and 105°, until a few hours before death, which occurred on the eighth day. At the *post-mortem* examination nothing was found but peritonitis and its results; its cause was not found.

Lipothymia.—I will next speak of that marked failure of the vital functions (that is to say, of the circulation, respiration, and body heat) which very often accompanies peritonitis. It is a matter for surprise and regret that we have no term in common use to express this set of symptoms. No English word being precise enough, I suggest that we resuscitate the Greek word *lipothymia* to denote *defectio animæ*, this failure of the vital constitution, whether it be attended or not by *lipopsychia*, *defectio animi*, or failure of the animal constitution marked by coma, delirium, or both. Sudden lipothymia is syncope or swooning, syncope due to injury is shock. Lipothymia is manifested by a small, weak, and

sometimes irregular pulse, by weakness of the heart sounds, by shallow breathing, by lividity with pallor (deathly paleness), and by algidity or failure of the body heat, at least so far as the skin is concerned; the inner heat, as measured in the rectum, may or may not fail to a proportionate degree. In peritonitis (apart from perforation) lipothymia sometimes marks the whole course of the disease (witness the Wandsworth epidemic to which I referred a short time since), and when to lividity, coldness of skin, and a weak small pulse are added diarrhoea with watery stools and suppression of urine the resemblance to cholera is great indeed. But more frequently lipothymia occurs only towards the end of life, and then it may assume, so far as the body heat is concerned, the form of lypiria (another ancient word which might be revived with advantage), that is to say, while the skin, especially of the limbs, is quite cold, the temperature of the inward parts, as measured by a thermometer in the rectum, is much above the normal; it may be 105°—a very bad prognostic sign in all acute diseases, and a plain proof of the extreme weakness of the circulation.

Lipothymia without Pain.—Another sign which sometimes attends this final lipothymia—this mortal agony or struggle with death—a sign which has attracted the notice of physicians from the earliest times—is the disappearance of pain and suffering whilst the patient remains perfectly conscious; yet all the symptoms of vital failure persist, and he only whose attention is fixed upon the local signs to the neglect of the prognostic condition of the whole patient can be surprised by what will seem to him to be a sudden and unexpected death. 'Twere curious to inquire into the causes of this cessation of pain, whether it be due to cessation of cramp, whether an anodyne poison be produced in the course of the disease, whether the lipothymia arrest the nutrition of the nerve endings, or whether the sensorium for pain be similarly affected, but I will say no more than to remind you, Sir, that an honourable predecessor of yours in that honourable chair—Sir Henry Hallford—once read before the College an essay dealing with this very topic.

Lipothymia without Abdominal Signs.—Still more remarkable, although much less common, is the case of peritonitis attacking a healthy person, lipothymia supervening in the course of a few hours from the beginning, and any local signs of abdominal disease disappearing at the same time. The patient when first seen makes little or no complaint of the abdomen; it is not swollen, and can be pressed deeply without causing pain. But the skin is cold, the heart beats very frequently, no pulse can be felt at the wrist, the respirations are very frequent, the secretion of urine is suppressed. The mind is affected little or much. The patient dies on the first or second day of illness. At the *post-mortem* examination acute peritonitis is found, but not necessarily perforation of the peritoneum or disease of any other abdominal structure.

Facies.—The last sign of acute peritonitis which I shall notice is that afforded by the look and expression of the face. These signs and such as these, which constitute the prognostics so much trusted by the earlier physicians, can be learnt in no other way than by a long familiarity with disease. If I allude to the countenance which still goes by the name of "*facies Hippocratica*," it is only to remark that Laennec has endeavoured to walk in the footsteps of his great predecessor, and to depict an expression of face often seen in peritonitis and other severe abdominal diseases. This peculiar look, which he calls *face grippée*, is due chiefly, if not wholly, to the features being drawn upwards, so that the forehead is more or less wrinkled, and the naso-labial furrows are drawn inwards and upwards towards the root of the nose and inner canthi of the eyes. I have compared Laennec's verbal picture with the living patient, and have found it to be true to Nature—but not universally true, not present in every case of acute peritonitis. Indeed, I think that the *face grippée* denotes abdominal pain, and that it usually disappears with the pain although the disease continue. But we must admit that the local suffering and local signs of disease may be very small, and yet the onset of peritonitis be denoted by a profound change in the expression of the patient's features. Surgeons remark this change when an operation is followed by peritonitis; physicians, also, when a perforation occurs in the course of typhoid fever.

LATENT PERITONITIS.

Now a few words concerning latent peritonitis. I have already spoken of peritonitis which is latent in respect of its local signs only—peritonitis in which universal signs of disease, those, namely, of alarming lipothymia, predominate to the exclusion of abdominal symptoms, the patient being killed in a day or two as if by the operation of a powerful venom. But peritonitis may be altogether latent, and manifested neither by local nor by universal symptoms—a form which is deuteropathic, intercurrent in the course of other serious disease, such as ascites, renal dropsy, empyema, pyæmia, or typhoid fever, the peritoneal inflammation being revealed by the *post-mortem* examination only. What surprise we may feel at this latency diminishes when we reflect that the signs of peritonitis have little or no relation to the peritoneum, but depend upon disorder of other viscera, adjacent or remote. Suppose the onset to be marked by vomiting, what is there distinctive in this? In what disease does vomiting not occur? Is not the stomach the great sympathiser with distress in any part of the body? Add some pain in the belly, and how does this help us? Possessing no direct physical signs of peritonitis, and being compelled to rely upon indirect disturbance of the functions of other viscera (for the peritoneum itself has no manifest functions), we cannot expect to discover the presence of peritonitis in cases such as these.

TYPES.

After analysing the symptoms of peritonitis, I might endeavour to arrange them so as to form concrete pictures of patients suffering from that disease; but I will say no more than this, that according as one or other symptom prevails, so does the appearance of cases of peritonitis differ; and the differences are so great that we have to admit divers forms or types of the disease. We cannot manage with fewer types than three, namely, peritonitis characterised by pain, or by ileus, or by lipothymia; for peritonitis discovered only after death cannot be admitted to be a form of disease as looked at from my present point of view. A given case of peritonitis is by no means necessarily constant to one type throughout; for instance, painful peritonitis may pass into ileus; and, moreover, the local and universal symptoms may be variously mixed. But the only reason I have for referring to facts so obvious is to be assisted by these types in comparing the signs of acute peritonitis with the signs of other peritoneal affections, which I will now proceed to do.

ACUTE ONSET OF CHRONIC PERITONITIS.

Peritonitis which is essentially chronic in its course sometimes sets in suddenly, and thus resembles at first the acute disease. This is often observed in the commonest kind of chronic peritonitis, the tuberculous; when, as I suppose, a sudden infection of the peritoneum takes place. The forms assumed by this acute onset of tuberculous peritonitis are the same as those I have just discussed. That most often met with begins with pain, vomiting, and sometimes diarrhoea, and is followed in a few days by meteorism, which may become very great. Lipothymia in a high degree may attend the choleric symptoms. The least common type, which assumes the form of ileus, deserves especial notice on account of its close resemblance to mechanical obstruction of the bowels; a resemblance so close that abdominal section has been performed in such a case under the notion that the patient was suffering from a strangulated hernia.

HÆMORRHAGE INTO THE PERITONEAL SAC.

Hæmorrhage into the peritoneal sac is another form of peritoneal disease in which we meet with these same types. The painful form is well illustrated by the case of "a woman, aged 29, who was brought to the hospital in a most alarming condition, although her illness had not lasted longer than a few hours. She had been suddenly attacked by great pain in the lower belly, and the pain had steadily increased. She had the *face grippée* and was deadly wan, her breathing short and frequent, interrupted by hiccough, her pulse hurried and very weak, her belly distended and tender. She died within forty-eight hours from the beginning. At the *post-mortem* examination, there were found in the peritoneal cavity nearly three pints of liquid blood which had come from one of the Fallopian tubes; no peritonitis."

How peritoneal hæmorrhage may be attended by ileus is shown by the case of a man, aged 22, who was admitted into St. Bartholomew's Hospital in an extreme state of shock following a fall off the tailboard of a van in motion. He complained of great pain at the pit of the stomach, and soon after the injury he began to vomit incessantly. On the second day the vomiting continued to be very frequent. He had a great desire to defæcate but passed nothing; his belly was very hard and tender; the urine was suppressed; his temperature was 99.6°. On the third day he was worse. Abdominal section was performed. The peritoneum was found to be full of dark liquid blood, and nothing more was discovered. On the fourth day he died; the blood came from a rent liver.

PERFORATION OF THE PERITONEUM.

A much more common acute affection of the peritoneum is that which I mention in the last place—namely, perforation or rupture of the wall of a canal or cavity or hollow viscus, and escape of its irritant contents into the peritoneal sac. When we seek to classify cases of this kind, we come upon the three or four types of which I have already so often spoken—the type characterised by pain, or by ileus, or by shock, and the latent type. But before depicting them, let us ask whether peritoneal perforation yield any peculiar physical signs? None, unless peritoneal tympanites ensue; and this depends, of course, upon the perforated cavity, whether it contain air or not. In the case of peritoneal tympanites, physical examination usually affords more or less probability of the presence of air in the peritoneal sac, but seldom an absolute certainty. The distension of the belly is often very great, and greater in perforation of the intestine than of the stomach; when the distension is very great, the skin is tense and shining to a degree seldom seen in intestinal tympanites. Visible coils of intestine or vermicular movements are decisive evidence of intestinal tympanites. Absence of the liver dulness to percussion is a useful, but not altogether trustworthy, sign of peritoneal tympanites; for when the intestines are extremely distended with air, they may come to lie between the liver and abdominal wall in front, and I have known this to happen even when the liver was enlarged to twice its natural size. On the other hand, adhesion of the liver's convex surface will obviously prevent the disappearance of its percussion dulness, even though the peritoneal cavity be full of air. The signs afforded by auscultation are less important, because they are common to all great accumulations of air within the abdomen, whether contained in stomach or intestines, or free in the peritoneal cavity. The chief sign is the bell sound discovered by Laennec. In his *Auscultation Médiate* he says that by percussing lightly, and at the same time applying the stethoscope near by, we shall hear a silvery resonance; clearer, he thinks, in peritoneal than in intestinal tympanites. I cannot do more than just mention the other auscultatory signs of a large air-containing cavity, and which are sometimes present in peritoneal tympanites—namely, an amphoric quality in the respiratory sounds heard over the abdomen, metallic tinkle, and succussion splash. A valuable sign is yielded sometimes by an escape of air into the cellular membrane of the abdominal walls; this fact, also, is alluded to by Laennec ("a sort of dry crackling is felt upon pressure," he says), and is, taken together with the signs aforesaid, peculiar to peritoneal tympanites as contrasted with the intestinal. Or the subcutaneous emphysema may be still more extensive. To conclude this topic of physical signs, I will remark that, although their presence is a great help to diagnosis, their absence proves nothing. Perforation of a part of the alimentary canal (for instance, the appendix vermiformis) may occur, may be followed by acutest peritonitis, and yet may be unaccompanied by peritoneal tympanites; nothing escapes from the rupture but offensive and poisonous pus.

With respect to the symptoms of peritoneal perforation, all cases may be referred to the four types so often spoken of—those characterised by pain, or by ileus, or by shock, and those not characterised at all, the disease being latent; latent, that is to say, so far as concerns the diagnosis.

PERFORATION CHARACTERISED BY PAIN: A HISTORICAL CASE.

First, of perforation characterised chiefly by pain. A lady had ailed for some time from pain in the stomach and the

side, but she seemed to be otherwise in good health. One day after dinner she complained several times of pain; she drank some succory water as a stomachic, and putting the cup down with one hand, with the other she pressed her side, and said in a voice which betokened much suffering: "Ha! what a stitch in the side; what pain; I cannot bear it." Speaking these words she flushed, and a moment afterwards turned pale, with a wan lividity which astonished everybody. She kept crying out, and begged to be carried away, for she could no longer hold up. Supported by the arms of others, she managed to walk, but with difficulty and bent double. Put to bed, she cried out more than ever that the pain in the pit of the stomach was past belief; she tossed from side to side. A physician was fetched, who pronounced her complaint to be colic, and who prescribed suitable remedies. But the pain continued; she said that her suffering was greater than could be conceived, and that she would die. All this occurred in less than half an hour. Whatever she swallowed made her retch; she brought up only a little mucus mixed with food. The efforts to vomit and the excessive pain threw her into a state of exhaustion which resembled repose; but she told the bystanders not to deceive themselves, that the pain was as great as ever, and that she had no strength left to cry out. She heard someone remark that she was easier, and she said: "That is so far from being true, that were I not a Christian I would kill myself, so great are my sufferings. It is wrong to wish evil to any," she added, "yet I would that somebody could feel for a moment what I feel, so as to know what my pain is like." Her pulse became imperceptible (*retiré*), her limbs cold; her friends anxiously asked if nothing more could be done; they suggested a score of remedies, and at last her physicians, in sheer desperation, made an attempt to bleed her, but the blood would not flow. They gave her some broth, for she had taken no food since dinner. She no sooner swallowed it than her sufferings (if not her pain) increased; she complained that her stomach was filling up. Death was painted on her face; the last struggle was short, and after two or three convulsive movements about her mouth she died, nine hours from the beginning of her illness.

Would you not suppose that I have set before you a living picture in words, taken from the pages of a modern Aræteus or of Sir Thomas Watson? or have you already recognised that I have been reading an account of the last hours of King Charles I's daughter, Henrietta, Duchess of Orleans—an account written by one of her ladies in waiting, Madame de La Fayette, 150 years before ulcer of the stomach was discovered, so we may say, by Cruveilhier? That the patient died from perforation of such an ulcer was proved by examination *post mortem*, although her physicians did not understand what they saw, and it was left for Littre to explain the real nature of her illness. I have always thought that reports of the kind just read, drawn up at the bedside by persons of keen intelligence but with no medical knowledge, are of great value. Such reports are true to Nature, for the reporters have no preconceived notions to discolour and distort the appearances of things. Moreover, these observers see the sufferer and nothing else; but we physicians, on the other hand, in our eagerness to discover abstract signs of disease and to arrange them into that wholly artificial notion which we call the diagnosis, are apt to overlook the patient.

THE DIAGNOSIS OF PERFORATION.

The physicians of Madame said that she was suffering from colic, and that a wretched pulse and cold limbs such as hers were common in that disease. I likewise have stood by a patient writhing under the throes consequent upon perforation of the stomach or duodenum, and have asked myself whether there was anything either in the pain or its concomitants which might not occur in intestinal colic, and have been compelled to admit that there was nothing. This difficulty in diagnosis is not to be wondered at if the pain be, as is very likely, in great part due to cramp or painful spasm of the intestines and stomach, and perhaps of the abdominal walls also. Yet our diagnosis may reach a high degree of probability under such conditions as these: The ruptured organ being more often either stomach or duodenum than any other, there may have been some forewarning symptoms of ulcer of one of those parts, the perforation occurring suddenly,

so does the pain, and especially after a full meal or an effort or both. The very acid contents of the stomach poured into the peritoneal cavity are excessively irritant, and the pain is violent in proportion, being far beyond the pain whereof the sufferer has had any experience or conception. The abdominal walls are contracted, tight, and hard, and often very tender. The pain will continue without remission to the end, or will cease altogether, or will only diminish—as I said when speaking of acute peritonitis.

The associated symptoms may or may not assist the diagnosis. Vomiting—often present—is sometimes absent. Some have thought that it is absent in perforation of the stomach especially, but the exceptions to this rule, if it be a rule, are many and of both kinds, namely, rupture of stomach attended by vomiting and rupture of a part not stomach, yet unattended by vomiting. Peritoneal tympanites will ensue if gas escape into the abdominal cavity, but gas does not always escape, even when some part of the alimentary canal is ruptured. Shock attends the rupture, and usually the lipothymia persists to the end. When perforation occurs in the course of a febrile disease defervescence is often a marked sign of shock. Suppression of the secretion of urine is common, and seems to be sufficiently explained by the vomiting and the lipothymia, and their necessary consequences—defective absorption and secretion.

PERFORATION CHARACTERISED BY ILEUS

The second kind of perforation—that characterised by ileus—is less common, and occurs especially in disease of the appendix vermiformis. The discharge of virulent offensive matter into the peritoneal sac seems to stun the intestines; they neither feel nor move. A woman, aged 22, was admitted into St. Bartholomew's Hospital on March 8th. She had taken, on the 5th, jalap and castor-oil to relieve her habitual constipation. The bowels acted soon afterwards three times. Otherwise she was, so she and her friends averred, in perfect health and quite free from pain or indications of disease in the abdomen or elsewhere. Her menses, due on the 5th, did not appear. On the 6th vomiting began, and it continued at intervals up to the time of admission. The bowels had not acted. She was admitted on the evening of the 8th, and one of my surgical colleagues, who happened to be at the hospital at the time, came straight to my house and told me that a woman with obstruction of the bowels had just been sent in to be under my care, and he thought that the question of operation arose. We obtained the assistance of another surgeon, and went to see her. We found a woman with no look of suffering, with a warm skin, a temperature of 99.2° in the armpit, and with no symptoms of failure of the vital functions unless indicated by a pulse of 144, which was, however, by no means weak or small. The abdomen was fat and moderately distended, the muscles were tight, but there was no tenderness excepting about the right loin; the right iliac fossa was carefully examined, but nothing could be felt. Examinations *per vaginam*, *per anum*, and for hernia detected nothing wrong. An enema had brought away feces. She vomited dark green liquid without smell. The urine was scanty; it contained a trace of albumen, was turbid with scaly epithelium and highly granular cylinders like renal tube casts, but there were no exudation corpuscles. The abdomen was opened; thin purulent liquid escaped, the small intestines were distended and purplish brown in colour. Examining the appendix vermiformis, we found a sloughy hole at its insertion into the cæcum, the rest of the appendix much dilated, its lining membrane ulcerated and granular throughout, the outer surface covered with lymph. She died two or three hours after the operation. Nowhere any anatomical obstruction of the bowels.

Between this form of disease and painful febrile peritonitis there are all possible varieties in respect of association of symptoms, the ileus being attended by more or less pain, tenderness, and fever. Peritoneal tympanites is often absent, any distension of the abdomen being due to acutest peritonitis, to intestinal tympanites, and inflammatory liquid effusion.

PERFORATION CHARACTERISED BY SHOCK.

The third kind of perforation is characterised by shock. In some cases, particularly in rupture of the stomach or duodenum, the shock kills within a few hours, and may be justly

compared to the effect of a blow upon the pit of the stomach, though why the shock of abdominal injury should be so especially profound I will not undertake to explain. In other cases the patient lives a day or two, yet never rallies. A man, 40 years of age, who was under treatment for a chronic ulcer of the stomach, became suddenly, at 8 o'clock one morning, pale, pulseless, and delirious (lipopsychia); he had evidently undergone a great shock. Throughout the day he continued to be delirious; consciousness never fully returned. Considerable reaction took place; his skin became hot, his pulse full and frequent; he retched a little, but did not vomit. The same night he became comatose, and so died at 8 o'clock next morning. I regret being unable to say whether the urine was suppressed or not. On examining the body the ulcer was found to involve the pylorus, and to have perforated on the duodenal side thereof. The contents of the stomach were in the peritoneal cavity, but there were no signs of peritonitis, neither excessive vascularity, nor exudation of lymph. This kind of perforation closely resembles other abdominal diseases in which lipothymia predominates. You, Sir, have remarked how perforation of the duodenum will simulate Asiatic cholera in its algid stage; the physicians who attended the Duchess of Orleans came finally to the opinion that she died of cholera morbus; and Dr. Wm. Sedgwick has discussed this topic very fully with especial reference to the suppression of urine.

LATENT PERFORATION.

Lastly, the perforation may be latent; that is to say, unattended by any symptoms adequate to the diagnosis. Not that symptoms are utterly wanting; this is seldom the case; there are more or fewer of those so often mentioned—pain, vomiting, lipothymia, and the rest—but they are rendered obscure by occurring in the course of a disease marked by no less serious disorders. The contrast between a person when in good health and when suffering from perforation of the peritoneum is great indeed; but when a patient has been exhausted by four or five weeks of severe typhoid fever, the occurrence of perforation may be a comparative trifle, so far as symptoms are concerned; a little pain in the belly, a little vomiting, attracts no attention. Or there may be no pain, no tenderness, no vomiting; nothing but a sudden defervescence. Or, again, a change in the patient's look is sometimes the chief sign. During a state of typhomania, in particular, the gravest intercurrent lesions often happen unsuspected.

But perforation, latent so far as symptoms are concerned, will sometimes yield one or more of the physical signs of peritoneal tympanites. For instance, in the later stage of typhoid fever, a rapid and great distension of the belly, such as to stretch the skin and make it shine, and attended by disappearance of the liver dullness to percussion, is a tolerably trustworthy token of intestinal perforation, and is sometimes the only token. The liver dullness may disappear before the abdomen becomes distended.

INCISION FOR THE PURPOSE OF DIAGNOSIS.

To conclude by referring once more to puncture of the peritoneum as a means for ascertaining the presence of inflammatory effusion. A small incision would seem to be justified by conditions such as these: First, the patient is suffering from acute peritonitis, and the indications of poisonous infection of the blood are becoming more and more marked; or next, there are reasons for believing that perforation of the peritoneum has occurred. In either case, unless we can bring relief, the patient must die. A small incision will not make him worse; nay, to drain the peritoneal cavity affords a chance of recovery; the only objection lies in the natural dislike to an operation, however small. I wish I could believe that chloroform sleep did no harm, but I fear that this drug has a depressing effect upon persons suffering from acute peritonitis. However, suppose a small incision made, and we find that the peritoneum contains pus or air, beyond simple drainage two further courses lie open to us; we may follow John Hunter's suggestion, and wash the belly out with warm water, a proceeding more serious than simple drainage, or we may enlarge the incision and search for the cause of the peritonitis, a proceeding highly dangerous, for you will, I think, agree with me when I say that operations of this kind have seldom any other effect than to hasten the patient's end. A simple puncture, if it do

not save the patient's life, will at least bring the satisfaction of knowing that the nature of the disease has not been misunderstood.

PERITONITIS: ITS NATURE & PREVENTION.

*Being the Main Argument of a Paper read before
the Harveian Society of London.*

By LAWSON TAIT, F.R.C.S.ED., L.R.C.P.ED.

THE FUNCTIONS OF THE PERITONEUM.

THE peritoneum, for many reasons which need not here be discussed, cannot be regarded as a gland nor yet a mere lymph sac, but its importance in the human economy is so great, that I am disposed to rank it almost next in order to the brain. Not only does it appear in the very earliest stages of embryonic formation, but, if we exclude gross mechanical lesion such as acute hæmorrhage, cardiac valve rupture or other failure, destructive hæmorrhage at the base of the brain, there is hardly any such rapidly and certainly fatal disease as simple inflammation of the peritoneum. Opportunities of studying the facts of the peritoneum are very common, so that our fundamental ignorance is not very creditable. The mere gross anatomy of the peritoneum is usually dismissed in textbooks by an explanation that its peculiarities are for the purpose of allowing the free movement of its involved organs, but I published a number of cases¹ in which there were such variations of the peritoneum (in one case no peritoneum at all), that it is perfectly certain patients may live with very material modifications of this freedom of movement. This is also proved by the fact that peritoneal adhesions, even of the most intricate and extensive kind, seem to give little or no inconvenience of themselves. The peritoneum is developed very early in embryonic life, and many other very important structures are separated from it in the changes. In a certain line of development its functions seem to lie chiefly in the direction of assisting a proper ovulation, but bit by bit it comes to be apparent that all the great organs of the body, except those of the nervous system, seem to require to be involved in its folds in a very curious and singularly invariable way. This does not exclude the heart and lungs, though in the higher vertebrates these have a further and more specialised separation. It is impossible to regard such a fact as this without a suspicion being aroused that there is some definite physiological purpose to be served by its curious plications. If we contrast two such viscera as the bladder and the stomach, we find the former but slightly related to the folds of the peritoneum compared to the latter, yet the movements of distension and contraction are relatively greater in the bladder than in the stomach, therefore mere facility of movement is no explanation of the great cavities.

The bladder is very slightly an organ of secretion and absorption. It has a very scant arrangement of adenoid tissue in its walls. The stomach is essentially an organ of absorption and secretion, and quite half its bulk is gland tissue, and therefore we may find that the arrangement of the peritoneum is associated with glandular function. Certain it is that all the great organs which are regarded as having functions preparatory to and essential to the general nutrition of the body, and most of those regarded as excretory, have this curiously-involved relation to this mysterious and complex membrane, with the doubtful exception of the pancreas. Further, the membrane itself has a series of strange and invariable plications and redundances of surfaces, the omenta, mesenteries, and various appendices which, should its function be that of active secretion or absorption, clearly must be of great service. Then, finally, its surface everywhere is excessively vascular; hyperæmic, as it were, its minute anatomy shows abundant arrangement of stomata, like those on the leaves of a tree, eminently suggestive of active work of some kind. It is most profusely supplied by nerves which are not derived from the motor tract. Normally these nerves convey no sensation, and there-

¹ *Journal of Anatomy*, 1874.