She rallied from the operation very well, and for eight days seemed likely to recover, but as soon as the stitches were removed from the wound it reopened and continued to discharge a large quantity of unhealthy brown purulent fluid until her death, seventeen days after the operation. Here again, unfortunately, no post-mortem examination was obtained, and therefore I can say nothing with absolute certainty as to the origin of the tumor, but my belief is that this also was a cyst of the urachus.

In both of these cases I inserted drainage-tubes into the cavity left by the cysts, and I am under the impression these tubes had something to do with the fatal results, though this may not be the case. The explanation of the deaths is of course first of all to be found in the advanced condition of exhaustion in which both patients were at the time of operation, and I think it very likely that a fortunate result would have been obtained in both of them if the operations had been performed earlier in the histories of the cases. Perhaps the immediate cause of death was the destruction of the vitality of the peritoneum, which was associated with the inner wall of the cyst. In both cases the extent of peritoneum denuded from the cyst-tissue, to which it doubtless owed its blood-supply, was very great, and if this important structure died from loss of its blood-supply, it would of course be quite sufficient to account for the deaths of the patients. I think if I should ever have similar cases I should feel inclined to remove a large portion of this denuded peritoneum and trust to a careful arrangement by sutures of the portions left rather than run the risk of what I think may have been the cause of death, for I often find I have to remove in cases of adherent cyst a very large piece of parietal peritoneum, and this is done without interfering in any way with the recovery of the patient.

These cases illustrate very well the unexpected and great difficulties which arise in the practice of abdominal surgery, and how much we have yet to learn in this important branch of our art. They also illustrate the abundant causes we have for regretting that abdominal tumors are often allowed to go so long as to remove any reasonable prospect of success in dealing with them.

Before dealing with the very numerous conditions which simulate ovarian tumors it will be convenient if I now discuss the signs and symptoms by which an ovarian tumor may be recognized; and I may here say at once that the conditions which mimic these tumors are so numerous, and there are so few facts in connection with them upon which implicit reliance can



be placed, that safety is to be found only in the process of reasoning by exclusion; that is, for a proper diagnosis in the case of an ovarian tumor it will be found the best plan, first of all, to make a mental list of all the conditions that it may be, and exclude them one after another until no alternative is left. Any one who habitually follows a converse plan will sooner or later be led into some fatal blunder. Our anxiety should always be, not to prove that a given tumor is ovarian, but to show that it cannot by any possibility be anything else.

It may be said with perfect certainty that from the history alone no ovarian tumor could be diagnosed, so various are the stories told by the patients about their cases. Thus one patient will present herself totally unaware of the fact that there is any tumor, her only sensation being one of discomfort from the swelling, while another may have known for many years of the presence of a small lump which had long remained quiescent, and had taken to enlarging only for a few weeks or months. The rate of increase gives no guide, either in unilocular or in multilocular tumors; for I have removed multilocular tumors which had been in progress for a great many years, and I have removed one of great size from a patient aged sixty-six, which had grown in four months. I have removed, on the other hand, a large unilocular parovarian tumor which had been in existence for more than ten years, and the structure of which showed that it always had been unilocular; and I have removed two unilocular tumors, one of which grew so as to completely distend the abdomen in seven weeks, and another, almost as large, which had not been noticed for more than five weeks.

The details given by the patients as to the region in which the tumors were first observed are often very misleading, and no dependence whatever can be placed on some. One patient, in whom there existed an undoubted fibroid tumor of the uterus, asserted that it originally grew somewhere in the neighborhood of the spleen, and gradually descended to its present uterine situation. Tumors of one ovary are often stated by their bearers to have originated on the side opposite to that from which they are found to grow. One condition which on rare occasions comes under our notice, hydatids of the peritoneum, beginning as it does generally by rupture of an acephalocyst of the liver, presents usually a history of origin at the upper part of the abdomen; so that, when such a story is given with subsequent general enlargement of the abdomen, caution is necessary before excluding hydatids from the possibilities. A tumor which began centrally and remains so is of course likely to be uterine; but this is far from being constantly the rule. I have heard a pa-

tient state that an ovarian tumor of considerable size had appeared suddenly; and this might have really happened, for its escape from the pelvis might have been sudden. I have often pushed an ovarian tumor out of the pelvis that had been impacted there, and the same thing may be experienced with uterine myomata.

The menstrual histories given by patients with ovarian tumors have been so various, in my experience, as to lead me almost entirely to disregard them in the diagnosis. Dubois asserted that he had not known an ovarian cystic tumor accompanied by hemorrhage, but this has been repeatedly noticed in my practice; and the explanation of the apparent discrepancy is that, when the great obstetrician wrote, the diagnosis of pelvic tumors had not arrived at its present state. In some instances, two of which I have already detailed, ovarian tumors gave rise to uncontrollable menorrhagia, and I have pointed out that there seems to be a close association with small cystic ovaries and this serious symptom.

I have frequently known complete arrest of menstruation to be associated with rapidly growing tumors both of the ovary and parovarium. Such a fact in the history of any case ought to make us especially careful to eliminate pregnancy, more especially the condition of hydramnios, which I have known to be treated fatally on two occasions by tapping, once as an ovarian tumor and once as ascites. The uterus, in the early months of normal pregnancy, is not unfrequently displaced to one or other side, and has been often mistaken for an ovarian cyst; in one case, by myself, for an abscess in the broad ligament. In this latter case, I was led astray by the general symptoms of hectic from which the patient suffered. It was to me a lesson to trust to no one symptom, nor to any group of symptoms, in a pelvic diagnosis; fortunately the patient recovered completely after a miscarriage.

A large number of cases of ovarian tumor are met with near the climacteric period of life, and it is not unusual for their appearance to be ushered in by a premature arrest of menstruation; so that during the first few months of the growth of the tumor the patient takes it for granted that she is pregnant. It is somewhat curious that I have had at the same time under my care two cases upon whom I performed ovariotomy, in both of whom pregnancy was believed to exist for many months until the lapse of time made an investigation advisable. Arrest of menstruation occurred in both before the tumor was observed, so that the abdominal enlargement was of course taken for pregnancy. In one case the abdominal parietes were so dropsical that it was a



matter of great difficulty to be certain that there was not pregnancy as well as an ovarian tumor, the difficulty being overcome by the use of the sound after some hesitation.

For the diagnosis of ovarian tumors, either subjective or differential, there are varieties of symptoms, almost numberless, the great majority being of little or no consequence for accuracy, and none of them alone being trustworthy. The symptoms vary in their character and intensity very much according to the size of the tumor, though this is far from being the rule. Thus the largest ovarian tumor which I have removed, somewhere over one hundred pounds in weight, gave rise to no other symptoms than the inability of the patient to get about from its immense weight; while the smallest, only six and a half ounces, was the source of agonizing pain and a great variety of reflex symptoms, including aphonia; and it had completely disabled the patient for some years. In the early growth of a simple cyst, symptoms of any kind are seldom met with until the tumor is sufficiently large to be impacted in the pelvis. The growth of dermoid cysts, on the contrary, is often accompanied by pain of a most intense kind, for which no explanation can be advanced.

In one case, already referred to, I had to remove a very small dermoid cyst on account of the agonizing pain in it. Though this has been relieved completely, a variety of nervous symptoms have supervened, very mysterious in their nature, for which no remedy has been found, and which, among other results, have induced a contraction in the hamstring muscles, and an absolute rigidity of the knees, so that the patient has never been able to walk since the operation, now nearly ten years.

As a rule, pain is not met with until cystic tumors are large enough, if out of the pelvis, to press on important viscera; or unless the surface of the tumor undergoes inflammatory change. In the latter case, pain and increase of pulse and temperature are the indications, though it is surprising to what an extent a tumor may be found to be adherent, and yet, throughout its history, no indications of inflammatory attacks have been given. Until the tumor is sufficiently large to interfere with nutrition, and if it be not of a cancerous character, there are rarely any symptoms of constitutional disturbance; though sometimes I have seen a small tumor very loose in the cavity of the abdomen give rise to great pain and discomfort. Such tumors also occasionally give rise to symptoms of intestinal obstruction, as was the case in the instance of a large uterine myoma which I successfully removed by abdominal section.

During the growth of an ovarian tumor, the appetite is usually not interfered with until the case is far advanced; nor is sleep,

though it is often found that the patient can lie only on one side; nor do we find that either the temperature or the pulse is affected to any appreciable extent. Hysteria is sometimes found in connection with ovarian tumors, and dependent directly upon them. In one of my cases this was markedly the fact, for the hysteria disappeared entirely after recovery from ovariotomy. Hysterical symptoms are in constant association with phantom tumors, and these cases, in the days of the early ovariotomists, were in several instances operated upon by mistake.

The enlargement of the veins often seen in the skin of the abdomen in cases of ovarian tumor is of no great assistance as a diagnostic sign, for it is present in almost every other disease simulating ovarian dropsy. Any very marked enlargement of the veins may, however, be a reason for suspecting malignant disease if the other indications be negative. In one or two instances I have seen this enlargement the only indication of the cancer found on opening the abdomen.

As the tumor enlarges, the symptoms become more numerous and various; thus in the pelvis, by pressure on the rectum, bladder, and nerves, it may give rise to dysuria or incontinence, to constipation or diarrhœa, and to various neuralgiæ. In the abdominal cavity, by pressure on the stomach, liver, and diaphragm, it produces very frequently nausea and vomiting, and distaste for food; in one case in my own experience it caused jaundice; and very often difficulty of breathing, amounting in the latter stages to orthopnœa, is induced. Coincidently with the production of these visceral symptoms, indications of great systemic alterations come on gradually, due partly to direct interference with nutrition and partly to its perversion. Thus the patient becomes thinner, and the skin dry and often hot, the eyes sink, and the features become pinched, and then comes on the peculiar expression of face which has been named the "facies ovariana." The legs at this stage generally become œdematous, from the mechanical obstruction to the return of the blood from the limbs, and the œdema extends to the vulva and over the lower and central walls of the abdomen. When the tumor has reached such extreme size as is indicated by these symptoms, if then seen for the first time, its diagnosis becomes a matter of some difficulty, even by the careful consideration of its signs; for it is in the very small and in the very large ovarian tumors that the diagnosis is most difficult. In those of medium size the task is much more easy.

The physical signs which indicate the presence of an ovarian tumor come under the notice of the surgeon, as a rule, only when the tumor has reached a size sufficient to have obliged it



to rise out of the pelvis, and appear as an abdominal enlargement. It is often, however, necessary to determine the nature of a small pelvic tumor, and, as I have already said, to remove it. Such a diagnosis is a matter of no great difficulty to any one accustomed to make the bimanual examination, more especially if it be conducted while the patient is under the influence of an anæsthetic. An ovarian tumor will be found to be almost invariably behind the uterus, that viscus being pressed forward close to the pubic bone; and its fundus may, save in exceptionally obese patients, be felt just above the pubes. Usually the uterus can be fixed between the two hands, and then no doubt can be entertained as to what it is. Behind it is the tumor, and if the uterus can be moved independently of it, and if the tumor can also be raised out of the pelvis independently of the uterus, no doubt need be felt that it is a tumor of the ovary or of the broad ligament. An absolute determination between these two is not a matter of much importance, but it may be made by the practised fingers being able to determine a uniform intensity of the fluctuation wave in different diameters of the tumor, and by this being also distinguished between the two forefingers in bimanual examination.

As the tumor increases in size and rises out of the pelvis it becomes somewhat more difficult to determine that it is not intimately associated with the uterus. It may be necessary to introduce the sound in order to determine this point; but this, as a rule to which I think there can scarcely be an exception, ought never to be done at the first examination. I have known a miscarriage, in more than one instance, brought on by neglect of this rule by very competent surgeons. It not unfrequently happens that menstruation, or some loss resembling it, goes on for the first few months of pregnancy; and to assert the diagnosis between early pregnancy and an ovarian tumor just rising out of the pelvis, at a first examination, is a task which only the rash or the greatly experienced will undertake. If, with the patient on her back, one forefinger on the os uteri and the other on the fundus of the tumor, the two be found to embrace something which moves *en masse*, then it is, of course, certainly uterine. But if the two fingers seem to be in relation with different structures, then the outside finger must search for the fundus uteri, and after it has been found, and after it has been ascertained that the uterus is not enlarged, *and then only*, the sound may be introduced into the uterus, and its relation to the tumor readily ascertained. The first matter, then, is to be certain that the tumor is not uterine. If it be not, and it be rounded, elastic, and capable of being raised to some extent out of the pel-

vis, then it is almost certainly ovarian. It still may be ovarian, even if fixed to the pelvis, though it is rare that ovarian tumors contract adhesions at such an early stage of their growth. If fixed, then, it may be a hæmatocele, or an abscess, or a soft tumor growing from bone; but the diagnosis of all these may be greatly assisted by the previous history and the general symptoms.

Examination by the rectum will often yield valuable additions to the information obtained by vaginal examination as to the relations of a pelvic tumor, and it may be carried out according to Simon's plan, by the introduction of the whole hand into the rectum. This should only be done, however, under exceptional circumstances, when other means have failed to satisfy the mind of the examiner, and surgeons having large hands should not attempt it. Personally, I have never employed this method, and I do not think it has met with very general acceptance. I saw Dr. Simon perform it several times at Heidelberg, and he informed me that he never found any ill-effects from it. I have since heard, however, of many disasters from its use in this country, none of which have I seen published, and I think it had better be dismissed.

When an ovarian tumor has risen out of the pelvis, and has as yet met with none of the accidents to which they are liable, and which lead to complications, its diagnosis is a matter of ease. First of all, palpation will discover that it is a tumor by its resistance, and firm pressure on it with the fingers of one hand, and percussion on them with the fingers of the other yielding a dull note, will exclude the possibility of the case being one of phantom tumor; and, as the tumor pushes the intestines before it upward and to each side, in these regions a tympanic note will give the indications by percussion peculiar to uterine and ovarian tumors, what I have termed the "tympanic corona." It must be remembered, however, that some intestine may have slipped down in front of an ovarian or uterine tumor, or some may be adherent there, so as to produce a note of clear resonance. This condition is, however, very exceptional, and if a resonant note be found in front of the tumor the chances are greatly against it being ovarian.

Mr. Spencer Wells has pointed out one very exceptional condition which may completely baffle us in drawing conclusions from the percussion sign. I have never seen it, am very doubtful about it, and therefore I give at length an extract from his lectures on the subject:

"Another point of doubt and difficulty may arise from the air having entered an ovarian cyst; for, as an ovarian cyst contains



a certain amount of fluid, it may also contain gas, and either the fluid is decomposed after tapping, or there may have been some possible communication set up between the intestine and the interior of the cyst. Sir Thomas Watson records a case in which a patient had a cyst filled alternately with fluid and with air; when the fluid collected to a certain quantity it seemed to open some valve-like communication with the intestine, emptied itself, and became filled with air. As the fluid gradually reformed, the air was displaced, and the same series of changes went through again. I have known a case in which air distinctly entered."

To exclude the possibility of the tumor being uterine, some care is necessary; but it is not difficult when the educated touch has determined that the tumor fluctuates, and that, throughout its extent, the peculiar wave passes which is found on gently striking any part of a bag of fluid while the hand rests on some other part of its circumference. A knowledge of what fluctuation is, and what this peculiar thrill is, is not easily communicated by description, and it requires long practice to be able to recognize it accurately.

If the wave be equally distributed in every direction all over a tumor, then, in all probability, it is unilocular. A multilocular tumor, or one composed of two or three large cysts, may often be recognized by the practised fingers detecting a difference in intensity of the wave along different diameters of the tumor. There are two conditions, however, which must be carefully excluded from the possibilities, and, just because they are both very uncommon, their probabilities are every now and then overlooked. They are cystic diseases of the uterus and hydramnios. In the former, the tumor will be found associated with the uterus, the latter moving along with the tumor when it is moved, and being dragged upward by it to an extent that ought always to make us cautious, and warn us to wait and watch.

Finally, there is that great aid to diagnosis, the employment of an anæsthetic, without which, in every case of doubt, no positive opinion should be arrived at. When the muscles are completely relaxed a great deal may be determined which is not possible otherwise, especially in the pelvis.

I need not say that in all cases of abdominal tumor vaginal examination of the pelvis is of the utmost importance. As far as ovarian or parovarian tumors are concerned, the most important indication is when a vaginal examination gives entirely negative results, that is, when there is nothing felt in the pelvis save the uterus in its normal position and freely movable. We may then take it for granted that the pelvic relations of the tu-

mor are of the most favorable kind and that the pedicle is of reasonable length. If the tumor is felt in the pelvis it will generally be behind the uterus, but this is by no means a uniform condition. The uterus may be behind the tumor, and in that case the chances are that it is sessile and a good deal of trouble will be experienced in dealing with the pedicle. If the cervix is found to widen out and be associated with the tumor in every direction, we have a clear indication that the tumor is uterine, that is, it may be pregnancy or a myoma. If the uterus is drawn up very much in front and the posterior lip seems to be lost upon the tumor, then we may expect a tubal pregnancy. But on the other hand it is not to be assumed that a tumor felt in the pelvis must necessarily be either ovarian or uterine, for I have felt in the pelvis tumors of the kidney, spleen, and liver; and then we may also have exceptional growths, such as malignant tumors of the bones of the pelvis or of the omentum, and hydatids of the peritoneum, etc., etc.

Auscultation of ovarian tumors gives chiefly negative signs, but these are often of value, as in the case of perfect absence of intestinal gurgling over the tumor. A loud friction-sound is often heard, but this is only an indication of a dryness of the peritoneal surfaces where it is heard, and there is sure to be an absence of adhesions at the spot. The hydatid fremitus, as described by Mr. Wells, I have never been fortunate enough to meet with, though I have operated on a large number of cases of this disease.

Dr. Le Double, of Tours, read a memoir at the meeting of the Scientific Congress at Havre on this subject, but I have not gathered from it any new facts of importance.

The best way to learn to recognize fluctuation is to practise upon a large bladder having a nozzle inserted into it so that its tension may be varied; for it will be found that there is a considerable difference in fluctuation according as the cyst is tightly filled or not. The sensation will also vary very much according to the weight with which the fingers of the examiner are pressed upon the cyst; and the first instruction I have always to give any one who is observing abdominal fluctuation for the first time is to press as lightly as possible upon the skin. Placing the finger-tips of one hand gently upon the surface and retaining them there immovably, the fingers of the other hand must be tapped with exceeding gentleness on the skin at some little distance. I lay particular stress upon the immobility of the first hand because it is not unusual to see persons endeavoring to ascertain the presence of fluid in the abdomen by a simultaneous to-and-fro movement of both hands, which can only



result in wobbling the contents without conveying any real impression to the observer's mind.

The first thing to be learned is that in the subcutaneous layer of any patient not extremely emaciated there may be communicated between the two hands a wave something like that produced by the presence of fluid, but having become familiar with this by practising upon a healthy abdomen, especially that of a stout person, this difficulty will speedily be eliminated.

A further test in cases of doubt may be applied by the method first suggested by Sir James Paget of palpating first in one diameter and then at right angles to it, and this test will be perfectly safe if the umbilicus is included in the second diameter; for pseudo-fluctuation may be perceived in the first instance but will be corrected in the second. As Sir James Paget has pointed out, this phenomenon is due principally to the muscular tissue, which gives a thrill closely resembling the fluctuation of fluid across its length but not in the direction of the fibres. A very convenient position for studying this fact is the calf of the leg. Having made himself familiar with this superficial subcutaneous wave the pupil will be less liable to mistake it for the superficial wave of ascitic fluid, and still less liable to mistake it for the deeper wave of the fluid of an ovarian or other cyst.

Ascitic fluid may be generally recognized by the fact that it is associated with the uniform occurrence of a tympanic note on percussion; but when there is ascitic fluid as well as fluid contained within a cyst, we have a double wave of fluctuation extremely confusing but easily recognized by practised hands. There is a very simple and neat way of confirming the value of the sign of percussion in such a case which I have had occasion to practise, and which will almost always decide between ascites and ovarian dropsy in such exceptional cases. It consists in mapping out the marginal area of clear percussion note by a pen-and-ink line, and then ascertaining whether a clear note, obtained by percussing on a finger laid gently on the skin immediately outside that line, can be altered to a dull note by increasing the pressure. If this alteration takes place generally round the line or throughout its greater part, it may be taken for certain that an ovarian or parovarian tumor is present. On the other hand, if there be a clear note somewhere over the area of the swelling which is not removed by firm pressure, but is rather extended or intensified, still more if pressure bring out a clear note where dulness existed without it, then it will be evident that ascites is present, and not an ovarian cyst. The explanation of these signs is, that pressure round the margin of an ovarian tumor will bring it into more extensive relation with the

abdominal wall by displacing the intestines, and this is most easily accomplished in the epigastrium. In the converse condition, when a clear note is produced by pressure in ascites, the abdominal wall is brought into contact with floating intestine, the mesentery of which is so short, and the quantity of fluid so great, as to keep the structures apart in the absence of the pressure. We have, further, a difference between the clear percussion notes of ascites and ovarian dropsy, in that the former readily alters its position, always appearing at the part of the tumor highest in relation to the patient's position. Thus, in a doubtful case, if there be a corona of clearness above the supposed tumor, extending from the hepatic to the splenic regions, and any alteration of position, such as lowering the shoulders and raising the pelvis, should alter the position of the area of clearness to the region of the umbilicus, then the case is almost certainly one of peritoneal dropsy.

More than once I have met with a case where even this sign failed me, and where I have opened the abdomen to remove an ovarian tumor and found only masses of peritoneal cancer. The reason of such a mistake was, that the intestines were all matted together by growths in the great omentum, and were drawn up into an arch under the diaphragm. The exploratory incision, however, did no harm, the patients recovering from it and dying some time after from the extension of the disease. Additional difficulty was created in one such case by the fact that the patient had been twice tapped before the operation, and no doubt was entertained that a cyst had been emptied, and that the masses felt were smaller cysts. I have also operated on a case in which no intestinal note could be obtained anywhere. The patient had suffered from recurrent peritonitis, and it was evident that the intestines were all behind the tumor. At the operation this was found to be the case, and the adhesions were of the most formidable character. Yet the patient recovered without a bad symptom.

The rapidity with which the waves travel is governed by three conditions chiefly. First, the thickness of the abdominal walls, and this will also influence the sharpness with which the wave is felt. The tension of the cyst will also materially affect the wave transit, for in the tightly filled cyst the wave rushes along with great rapidity, while in the flaccid cyst it is transmitted much more slowly and is so much less easily perceived that the unpractised observer may altogether miss it. If the contents of the cyst are thick and gluey it may be altogether impossible to obtain anything like a distinct wave of fluctuation, and there are many cases of really solid tumors, more particularly the œdematous variety of uterine myoma, which are sufficiently soft to give a wave of fluctuation which makes it impossible to discriminate them from ovarian cystomata with gluey contents. In fact I do not know anything more difficult to teach than the many facts about this sign of fluctuation. I do not know anything requiring longer practice and greater variety of experience for being perfectly learned; but I also know nothing giving greater diagnostic power when the fingers have been sufficiently trained to perceive its differences. Thus, given a case of ovarian tumor in a young woman and another case of advanced pregnancy, the practised fingers alone, without any question being asked, without a vaginal examination being even proposed, and without the use of the stethoscope, will in the majority of cases at once be able to make an exact diagnosis; while in the case of a large uterine myoma, the mere sense of resistance upon the first impact of the hand is often enough to determine the nature of the case. This "sense of resistance" is a thing quite impossible to teach. I saw it first practised by Dr. Warburton Begbie, and have seen him diagnose accurately and by it alone between an effusion of fluid in the pleura and consolidation of the lung. Similarly in the abdomen this sign is nearly always enough to enable me to discriminate between pregnancy, an ovarian tumor and a solid mass, though of course I should never dream of trusting to it alone.



Of a similar character is the sign to which French writers have given the term *ballottement*. This is not confined in its usefulness by any means to the determination of pregnancy. In a case where there is an abdominal tumor surrounded by ascitic fluid, the latter may be easily recognized by the sign of fluctuation, but the tumor may escape observation if an effort be not made to discover its *ballottement*. It is my uniform practice, therefore, in examining an abdomen in which I am satisfied of the presence of ascitic fluid, to place the fingers of one hand upon the skin very lightly, and then with a steady and somewhat rapid movement downward the ascitic fluid is made to move away, and if there be a tumor the fingers come promptly in contact with it and convey a sensation which cannot be mistaken. In cases of doubtful pregnancy this sign is well enough known, and there, of course, it is the liquor amnii which is displaced by the sudden movement of the fœtus which is felt. This ballottement may be determined through the abdominal walls with quite as good effect as through the vaginal cul-de-sac. If the fluid outside the cyst be small in quantity, its diagnosis is of no great consequence; but if large, its non-recognition may lead to serious mistakes. For instance, in one of my cases I satisfied myself