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LECTURES

ON THE

DIAGNOSIS AND SURGICAL TREATMENT OF ABDOMINAL TUMOURS.

Delivered at the Royal College of Surgeons of England.

BY

T. SPENCER WELLS, F.R.C.S.,

Professor of Surgery and Pathology in the College; and Consulting Surgeon to the Samaritan Hospital.

LECTURE IV—June 17th, 1878.

Details of Different Steps in the Operation of Ovariectomy—Position of Patient—Incision—Adhesions—Opening and Emptying of Cyst—its Removal—Treatment of Pedicle—Closure of Wound—Dressing and After-Treatment.

AT the end of the last lecture, we had a supposed patient upon the table, in the position in which we usually operate at the present day. I should say that some operators still prefer the old position, in which the patient is placed at the foot of the bed, in something like the position for lithotomy, or sitting half reclining on the table, the legs widely separated. Some operators fix the legs in a kind of splint. Péan and Hegar operate in this way, fixing the patient on a table, lying on her back, the legs separated, very much as if lithotomy were to be performed on the male. The operator sits between the legs of the patient, and operates sitting. I have seen Péan doing this. The reason he gives is that he is a long time operating. English operators, he says, operate too fast. He takes from one to two or three hours. It is extremely fatiguing for the surgeon to stand all that time, and therefore he prefers the sitting position. There are still operators in this country who prefer this position. It was always adopted by Mr. Baker Brown, and in my first three cases I followed the old practice, but I very soon gave it up. I found it extremely inconvenient to sit or stand between the legs of the patient. It was difficult to get to the bottom of the pelvis, difficult to tie bleeding vessels, difficult to arrange for the escape of fluid without letting it flow into the peritoneal cavity; and after the third case I adopted the position which I showed last week, and which is represented again to-day, on the ordinary dressing tables to be found in every house. The patient lies down; her knees are fastened down by a strap, the hands tied, and she is protected from the moisture of the spray (supposing it to be used) by this piece of India-rubber cloth, which is fixed over the abdomen and covers the chest of the patient. Then I also spoke of the length of the incision, the situation in which it is made along the linea alba, and the different precautions we use for checking the bleeding from vessels as they are divided, so that no blood may sink into the peritoneal cavity. I also spoke of the mode of opening the peritoneum, raising it up with this hook, making a small opening, and then passing a broad Key's director into the peritoneal cavity, and with a blunt pointed knife dividing the peritoneum upwards and downwards; speaking of the necessity of using a blunt pointed knife in order not to injure any of the viscera or the bladder. I also showed the trocar by which the cyst when exposed is punctured, withdrawing the point, emptying the cyst, the fluid running away through this tube into a pail, and then by a pair of forceps and the two hooks holding the cyst on to the cannula and withdrawing it gradually through the opening in the abdominal wall as the cyst is emptied. All that I spoke about in some detail at the last lecture.

The next point to consider is the mode of dealing with adhesions. Suppose that the cyst, instead of being free, instead of coming out when

it is empty, still adheres, either to the abdominal wall, or to some other part of the abdominal cavity, or to the omentum, or intestine, or to some of the structures in the pelvis. It is very possible, that in making the first incision, one has found the cyst is not free, but that it is closely adhering to the abdominal wall in front, and it is necessary to make a separation. Sometimes it may be well to do this while the cyst is tense, passing the fingers between the abdominal wall and the cyst, and, after separating some adhesions, to tap and empty; but if the adhesions be very close, I believe the safest plan is to empty the principal cyst before making any attempt to separate the adhesions. There are some obvious advantages in this mode of procedure. When the cyst is opened, there being only an incision in the abdominal wall, the peritoneum being still undisturbed, of course any fluid that escapes from the cyst cannot pass into the peritoneal cavity. It must run away through the opening made in the abdominal wall, and in this way the fluid can do no harm. Then, when the cyst is empty, it is often extremely easy to draw it out by passing one hand into the interior and then grasping the back of the cyst and inverting it, as it were, drawing out the back part through the opening made in the front part. In this way it will often come out without much trouble; whereas, if one attempt to proceed to separate an adhering cyst from the abdominal wall, without being very certain where the cyst and peritoneum join, mistakes are apt to be made. In many cases, when trying to separate closely adhering cysts, surgeons have torn off portions of the peritoneum, and have got into considerable trouble. When the cyst is closely adhering in front, I believe the best plan is to empty it, to invert it, to draw the posterior part of the cyst forwards, and endeavour to draw it out. If that cannot be done, and there are still firm adhesions, then it is necessary to proceed systematically and find out by carrying the incision upwards and downwards, exactly where the limit is between the cyst and abdominal wall, and proceeding to that point, one hand draws the cyst outwards, while with the other hand we separate it. Occasionally some very firm band must be divided with the knife or scissors, but it is very rarely this is the case; it almost always can be done without dissection. Then, when the adhesions have been separated, it may be occasionally necessary to break up the tumour—it is too large to come out through an incision of moderate length—and this may be done either by tapping any distinct cysts, or, with the fingers, tearing the septa which divide the cavity into several compartments, and when the contents of each compartment are pressed out the main cyst usually follows. If there be a great deal of solid matter, it may be necessary to extend the incision till the opening is sufficiently large to allow the tumour to pass outwards without using too much force.

The tumour having been drawn out of the abdomen, the pedicle comes into view. It is seen that the cyst is connected with one or other side of the uterus by a band of greater or less breadth, or by a sort of cord or root, long or short. This cord or pedicle may possibly be divided into more than one portion, but at any rate the connection between the uterus and the cyst is seen or felt, and this must be secured before it is divided. There are various ways of dealing with the pedicle. In the earliest operations, the pedicle was tied with whipcord, and the ends were brought out through the wound. After a time, leather ligatures were used and the ends were cut off short, and the ligature, with the pedicle, was returned into the abdominal cavity, and allowed to sink down into the pelvis. Still later, the use of the clamp was introduced by Mr. Hutchinson, and was followed by me and by others.

The different modes of using ligature, the clamp, and the cautery I will presently describe; but I will first show the clamp which, after a good many trials, is the one that is now used. This is a cyst which I removed last week. Here are the remains of the pedicle and the Fallopian tube; and this is where the cyst was separated from the side of the uterus. Now suppose that the cyst has been drawn out through the opening in the abdominal wall, and that round the neck or pedicle, between the cyst and the uterus, the clamp is applied in this manner. It is passed round at the precise spot selected, and is firmly grasped by these handles. Then the surgeon holds the whole perfectly secure

while he fastens the screw on the arc. I generally prefer, instead of trusting to my fingers, to take a pair of forceps, and, giving an additional turn to the screw, to fix the clamp so that there is a certainty that it will not slip. Occasionally, when one part of the pedicle is very much thinner than another part, it is possible the thin part might slip through and troublesome bleeding might follow. If there be any fear of that, it is a good plan to pass a ligature round the pedicle below the clamp and tie it. If the silk be passed round before the clamp is thoroughly tightened, it makes a circular constriction, presses it altogether into a circular form, and then the clamp is fastened. There are several advantages in doing this. You see exactly where you are going to put the clamp; it scarcely takes a moment of time, and putting the clamp over the tied part, it is so tightly held that there is no possibility of any thin part slipping out. That is the way in which the clamp is now used. There is the clamp. It is curved; whatever tension there may be, it does not press upon the sides of the wound. It holds the pedicle very firmly against the abdominal wall, and keeps any dead or dying portion of the pedicle well outside. The part that is left above the clamp outside the abdominal wall is very small, and upon this one sprinkles a little perchloride or persulphate of iron. This converts what would otherwise become putrid almost into hard leather, which cannot do any possible harm.

Supposing the pedicle is too short or too broad for the clamp to be used, or the surgeon wishes to use the ligature in any particular case, then it is easily done by one of these forms of needle. They are all made with blunt points. It is dangerous to use sharp-pointed instruments near the abdominal cavity, or with portions of small intestine occasionally coming in the way; and it is also advisable to avoid any wounds of the large veins which are frequently met with in a pedicle. Then, to avoid troublesome entanglement of the silk, I have had a double eye made, so that, after the instrument is past, the ligature is left almost ready for use. Even through the thick part of the wall of this cyst it is not difficult to push the blunt point, and then, when the instrument is withdrawn, two threads are ready to be tied. I first make what is known as the "surgeon's knot", so that there is no probability of its slipping, and I like an additional knot also, because I believe there is a greater safety in the surgeon's knot with a third knot than in any reef-knot. With the third knot and the pedicle tied in two or more parts, I believe it is, as a rule, secure; but sometimes, just at the point where the needle has been passed, the pedicle may split in a very troublesome way. The thin membrane of the broad ligament seems to separate, or the opening made by the needle extends or splits downwards, and blood oozes from it. If so, all that is necessary is to take another turn of the silk and just bring it round from one side to the other, so that the whole pedicle is compressed. The objection to doing that is, that it keeps the broad ligament rather too much on the stretch. It is better to leave it, if one can, with the different portions tied separately than to tie it all together. It crumples up the whole of the surface, and makes a tight band across the pelvis, which it is desirable to avoid.

The third mode one can adopt is by the cautery; but I think, before going into that, I will just ask you to suppose we have got so far with the operation, that the tumour has been removed, the clamp applied, or the ligature has been used and the tumour cut away. The next thing is to cleanse the peritoneal cavity of anything which ought to be removed from it, either blood that has oozed from the separated adhesions, or any ovarian fluid that may have accidentally passed into the

cavity, in spite of all the care we may have used; to do that, it is only necessary to take one sponge after another, and to carefully wipe away anything that there may be in the peritoneal cavity. I do not think we can be too careful about this. It is said that the sponging rubs off the delicate secreting surface of the peritoneum, and so does great harm. Microscopically, it has been shown that the peritoneum looks extremely bare after being sponged; but, practically, it is found that the more careful this sponging the better is the result to the patient. Just a word of caution as to the number of sponges. Be sure that every sponge passed into the peritoneal cavity is removed. There are cases on record in which a sponge has been found in the peritoneal cavity of a patient after her death. Once it occurred to me to make a mistake myself; but I got the sponge out afterwards. I was just finishing an operation when one of the gentlemen who was assisting me said: "You left a sponge in." I said to the nurse: "Count them." We always count the sponges before the operation. She said: "They are all here; I have sixteen." I said: "Are you quite sure you have them all?" I was feeling about the peritoneal cavity to try to find a sponge, but I could not find one. I took all the pains I could, and then the nurse said: "I am quite sure I have got them all." So I was satisfied, and I sewed up the wound. It was about two or three in the afternoon. At eight or nine o'clock at night, they came round to me to say the nurse missed one of the sponges, a sponge she knew; it could not be found; it must be in the patient. It was difficult to know what to do for the best. The patient seemed pretty well, and I did not like to open the abdominal cavity again to see whether there was a sponge there, so I decided to wait till the morning. In the morning, she seemed very ill; she had had a very restless night, and I thought it better to open the wound. I took out two stitches, and, the instant I put my finger in, I felt the sponge. It had been pressed, I suppose, by the movements of the intestines towards the wound, and there it was. I took it out, reclosed the wound, and the patient was not much the worse for it. So I would again impress upon you as strongly as I can the necessity of always counting the sponges, and always being quite sure they are all away. In one other case, I was a long time searching for a sponge before I could find it. No one who has not tried would believe the difficulty of finding a sponge in the abdominal cavity, if it be not very large and have become saturated with fluid. The lady was the wife of a surgeon, and I operated upon her in the fifth month of pregnancy. After the pedicle was secured and I was closing the wound, the nurse said there was a sponge missing. I said: "Are you quite sure?" She counted again, and said: "I am sure there is a sponge missing." I felt in every direction in this lady's abdomen; put my hand to the bottom of the pelvis, to the front of the uterus, and everywhere I could think; but find the sponge I could not. But at last, up at the back of the liver, between the liver and the diaphragm, I found a small sponge and removed it. The patient made an excellent recovery, in spite of all this groping. But this leads me to repeat the caution not to use sponges so small that they are not easily found.

When the peritoneum has been cleansed, the next thing is to close the wound. In the early cases, I closed the wound by hare-lip pins, putting a twisted suture round them. That plan is still followed by Koerberle and other well known operators. But, for a long time, I have only used pure silk. I have the needles threaded in pairs (two needles to each piece of silk), and put into a piece of carbolised gauze all ready for use. The needle with the thread is held in Mr. Wormald's needle-holder, the simplest and most satisfactory needle-holder one can use. Each needle is passed from within outwards. There is no danger of wounding the intestine, if the needles are passed in that way. Taking one side of the opening in the abdominal wall between the finger and thumb, one needle is passed from within outwards. This is easily done through any thickness of abdominal wall. On the other side of the opening, the second needle on the same piece of silk is used in the same way, and so the silk passed from within outwards is ready for tying the sides of the opening in the abdominal wall together. When one suture is passed, the assistant holds up the ends and you pass another. In this way, five or six, or eight, are employed, according to the length of the incision; and, when they are all made, it is ready for the tying process. I should have said that, before beginning to pass the sutures, a flat sponge is passed within the abdominal cavity, and is left behind the line of incision to be ready to catch any drop of blood that may pass inwards from each prick of the needle, and also serve to prevent any escape of intestine. In this way, with a large sponge covering the intestines and omentum, lying close behind the abdominal wall, you are kept safe from doing any possible harm. When all the stitches have been passed and the sponge is removed, the assistant grasps the abdominal wall and holds it tightly while the sutures are being tied, so that there can be no escape or

protrusion of intestine or omentum between the lips of the wound. There are cases on record in which fatal obstruction of intestines has occurred simply because the intestine has been tied in closing the wound. A loop of intestine has been sharply constricted by a suture, and in this way the patient has been absolutely killed. Sometimes a piece of omentum may be strangulated in the same way, and lead to troublesome vomiting, so that it is very necessary that the surgeon, in sewing up the abdominal wall, should occasionally pass his finger inwards behind the line of sutures, and make sure that there is nothing interfering between the two edges of the united wound.

The wound having been closed, the next thing is to apply the dressing and bandage. I have for many years followed the teaching of Sir James Paget, and endeavoured to keep all wounds as dry as possible. I believe a great deal of harm has been done by keeping them moist. My chief aim has been to keep all wounds quite dry, and I have tried a variety of modes of doing this: charcoal-bags, bags of carbolised lime, cotton-wool, and blotting-paper. The last thing I have tried seems to me to answer better than anything. It is gauze saturated with thymol, the last substitute for carbolic acid. Thymol and spermaceti are mixed together. The gauze is charged with it, and makes a very nice soft antiseptic dressing, which is simply put over the united wound. Eight or ten other folds are put over the first, and then you support the whole with strips of plaster and the flannel bandage (lined with linen or calico, to lessen the irritating action of the flannel on the skin of the patient), and this bandage is tightly fastened over the gauze with safety-pins. That being done, the patient is carried to bed, and is left there, quiet and comfortably warm, with only the nurse in the room.

Now a word or two about the cautery treatment. It originated in this way. Mr. John Clay of Birmingham contrived this instrument for separating adhesions with the cautery. This is what is called "Clay's adhesion-clamp". He passed it over any firm adhesion or any adhering portion of omentum, screwed it up, and then, with a cauterising iron heated in the fire, he burnt it off. There is a little rim here which prevents the cautery from slipping. Very soon after Mr. Clay had introduced this plan for treating adhesions and adhering omentum, Mr. Baker Brown extended the plan to the treatment of the pedicle. He found it did so well for adhesions and omentum, that he thought it would also do well for the pedicle; and here is one of his original instruments. The instrument is in two pieces. It is fastened on to the pedicle with a screw. When fastened, one of the irons, heated in the fire, was gradually passed along the cyst on the upper surface of the clamp. A guard prevented the iron from slipping, and an ivory plate prevented the clamp from getting overheated and burning the patient. Of course, with a large tumour, that was sometimes a troublesome process, and after a little practice I began to cut off the cyst; and then, with an ordinary druggist's plaster-spreading spatula, well heated, and used slowly, so as to burn or scorch the portion of the pedicle between the two blades of the clamp, it was very seldom in opening it that the vessels bled; but every now and then one or more did bleed. Various contrivances were made to avoid damage from that. The most convenient was the Russian, or Maslowsky's. The pedicle was seized with that; and then, as it only holds the cauterised part in certain portions, it was seen whether it was bleeding or not. Supposing it did bleed, then any bleeding vessel was tied. In a good many cases where the cautery was used, some vessels did bleed, and we had to resort to the ligature; and it was this uncertainty which led me, after great success with its use—I think, out of sixteen cases in which I tried it, only two died—finding it uncertain and troublesome, and that we were obliged often to use the ligature instead of trusting to the cautery only, I gradually abandoned it, and, in cases where I could not use the clamp, resorted to the ligature only. There are various forms of cautery and clamp. This is Maslowsky's cautery-clamp, which is a very convenient instrument, and has the advantage of two little catches which enable one, in opening it, to see whether the charred tissue is bleeding. Here is a piece of talc, the best non-conductor of heat known, which is placed beneath the clamp to guard the skin from the effects of the hot iron. And here is a very ingenious clamp made by a late colleague of mine, Dr. Wright, who had seen me troubled in one or two cases by bleeding in opening a cautery-clamp; and he arranged a set of screws by which one could open portions of the cautery in succession, to see whether any vessels bled or not. Once or twice I found it had the disadvantage, in opening it, of separating the two layers of charred tissue, and in that way setting up bleeding, which otherwise might not have occurred.

Different forms of clamp for use without any cautery, where we trust to the clamp alone, are here on the table. Mr. Hutchinson was the first to introduce it, and he first used the common "calliper" of the carpenters. This is simply a compass fixed by an arc and screw. That

is the instrument which Mr. Hutchinson used in his first cases, and it is really a very effective instrument. The pedicle is very well compressed by the calliper, and is quite tightly held. His first improvement was to make the handles so that they could be taken off, leaving the clamp only lying upon the abdomen of the patient, without any handle. Then there were trials made to make the blades act in a more parallel way. Here is one which I have kept as showing the amount of force I occasionally put upon the pedicle. This bend I actually made upon the pedicle of a living patient. When I took the clamp off, this strong piece of steel was bent in the way you see. Then I tried to get a clamp like the hæmorrhoidal clamp, as it is called. If I could get that action upon a pedicle, I thought we should have circular compression without the necessity of applying a ligature. Here is Kœberle's clamp, which he still uses, although it is extremely sharp, and evidently only intended for a small pedicle. After it is secured, the two rings serve to keep it from being drawn into the abdomen. The nearest approach to the circular clamp I succeeded in obtaining was made for me by Meyer and Meltzer. It acts so as to produce a very complete circular compression. It is easily fastened by the screw. But I found this (although it appears smooth and blunt enough) more than once cut the pedicle behind the place where it was applied, and led to troublesome and dangerous bleeding, so that I was obliged to abandon that; and, although I see it frequently figured in books, particularly foreign books, as my clamp, it is a clamp I have given up for the last seven or eight years.

But I should like to show you, before passing from the clamp, three preparations here from the museum, showing what takes place after the use of the clamp. Here is one from the abdomen of a patient who died from tetanus fourteen days after ovariectomy. Here is a portion of the abdominal wall; here are the remains of the pedicle brought through the closed opening round it; and on this side you see the way the Fallopian tube is fastened to the abdominal wall. In the second preparation, you may observe the uterus and the abdominal wall, with the pedicle of one ovary and a cyst in the other ovary. The patient died some years after ovariectomy, and after her death the cyst in the other ovary was found. This is a preparation removed two years after ovariectomy. I removed both ovaries. You see the two pedicles brought up adhering to the inner surface of the abdominal wall, and allowing free movement to the uterus.

Here I have a series of preparations which show the results of uniting the wound in the abdominal wall, including the peritoneum in the sutures, or not including it. In showing just now the way of using the silk and two needles, I said, "You pass it from within outwards"; but I did not sufficiently explain that, in doing this, it is necessary to include the whole thickness of the abdominal wall. It does not do simply to sew the skin together, or the skin and muscle together; the peritoneum must be included; the two edges of peritoneum must be folded together. In this way, they very soon unite, and the peritoneal cavity is completely protected from the sinking downwards or inwards of any blood or pus that may possibly form, or any blood from any small vessel that may go on oozing between the lips of the incision. If the two peritoneal surfaces be held together, they unite quite firmly and accurately. These preparations are the only examples of my own practice of vivisection, although I have been loudly accused of cruelty in the anti-vivisection journals. Really these preparations include the whole of my practice on the lower animals. I believe there were six rabbits, four guinea-pigs, and four dogs. Fourteen experiments upon the lower animals complete the list of my crimes, so far as vivisection is concerned. These specimens are really worth the attention of gentlemen after the lecture. They show the abdominal wall of rabbits united by passing iron-wire sutures. We were all using wire at that time. Everybody thought wire was better than silk; and in these two cases I united two wounds of the same size in two similar animals; in the one bringing the edges of the peritoneum together, and in the other not doing so. These animals were killed three days after the operation. In one preparation, the iron wires are seen on the outside quite distinctly; but on the inside it is impossible to see them. The peritoneal edges have been folded together; some lymph has been effused; and the sutures are covered just as if a coat of plaster had been put over a wall, and the abdominal cavity is most perfectly protected. In the other preparation, the sutures are seen just as distinctly inside the abdominal cavity as outside. You can see where the edges of the peritoneum are separated. You can distinctly see some quarter of an inch on either side of the roughened surface of the muscles. Here are other specimens. This is from a guinea-pig; and there, where the peritoneum was not united, a portion of intestine and omentum has adhered to the inner surface of the wound and blocked up the opening. Where the peritoneal edges were not accurately united, a part of the omentum has adhered and completed the

closing of the cavity. Here the same thing is shown from a dog. The large portion of omentum which has attached itself to the under surface of the abdominal wall is quite curious. The wound was left with the skin, fascia and muscles only united. Great care was taken to avoid the peritoneal edges; and then the peritoneal coat of the abdominal wall is completed by a portion of the omentum coming and adhering there. I do not think there could be a more complete proof of the propriety and necessity, in all cases of wounds of the abdominal wall, of bringing the two peritoneal edges accurately and closely together.

In the few minutes which are left before the clock strikes, I will show a very convenient form of lamp for throwing light upon any dark spot in the abdominal cavity, when it is difficult to find some small bleeding vessel. By concentrating such a ray of light as this portable lamp of Collins's gives upon it, it is often easy to find a vessel which cannot otherwise be found. In practice, this becomes of very great use.

Then, supposing one wishes to use the cautery, this is the well-known instrument of Paquelin, called a "thermo-cautère", and if there should be a return to the use of the cautery in ovariectomy, this would be the most convenient instrument one could use. It is simply a hollow platinum cautery first heated in a spirit-lamp, and then, by sending a stream of benzoline-vapour through the platinum end, a dull red heat or white heat can be kept up and maintained as long as the surgeon wishes it. Irons taken from a fire are clumsy. Copper cauteries are less liable to rust and scale off than iron; but platinum has the very great advantage of not rusting, and also the advantage that an assistant can, by working these bellows, keep up any degree of heat required, and the surgeon can use his cautery as long as he pleases. There is one little imperfection in the instrument: there should be some fastening to secure the plug in the bottle. If one use the bellows a little too forcibly, the air accumulates in the bottle rather faster than it passes through the tube, the plug flies out of the bottle, and the cautery cools just at the time when it is required.

ON CHANGES IN THE FORM OF THE CHEST RESULTING FROM LATERAL CURVATURE OF THE SPINE:

WITH ESPECIAL REFERENCE TO THE DIAGNOSIS OF PULMONARY DISEASE.

BY GEORGE JOHNSON, M.D., F.R.S.,

Professor of Clinical Medicine; Senior Physician to King's College Hospital; etc.

SOME degree of lateral curvature of the spine is notoriously very common in persons of all ages and of both sexes. With this lateral curvature of the spine there is usually associated an unsymmetrical conformation of the chest, which is very likely to be misinterpreted. Take the case of lateral curvature with the convexity of the curve in the dorsal region to the left: the vertebræ are rotated on their axis, the left transverse processes being turned somewhat backwards, and the right forwards. The result of these changes in the vertebral column will be elevation of the left shoulder, with relative lowering of the right, greater convexity of the ribs and of the chest-wall on the left side behind, with lessened curve of the ribs and flattening of the chest on the right side. In front, the relative convexity and flattening are reversed; the ribs and the chest-wall are seen to be flattened on the left side, and more convex and rounded on the right side. These changes in the form of the chest are represented in the diagram.

Now, a careless or an inexperienced observer is very likely to misinterpret these appearances. The flattening on the right side behind may be mistaken for the unilateral contraction of the chest which often results from an attack of pleurisy, while the flattening on the left side in front beneath the clavicle bears a striking resemblance to the depression of the chest-wall, which is frequently associated with chronic pneumonia or a tuberculous deposit at the apex of one lung.

Another noteworthy phenomenon is this: that, when the chest is unsymmetrical in form, one side being more arched and prominent than the other, the sound elicited on percussion is often unequal and of different pitch on the two sides, quite irrespectively of any physical change in the contents of the chest; and it will often be found that percussion on the flattened side of the chest elicits a louder and a clearer note than on the other side. The probable explanation of this is to be found in the fact that the straight ribs, when percussed, yield to the stroke and vibrate more freely than the more arched ribs. The force of the blow is diffused over the arched rib, upon which it produces scarcely any change of form and but little resonance. It is obvious that, *ceteris paribus*, the resonance on percussion bears a direct relation to the degree in which the walls of the chest bend and vibrate under the blow. Thus percussion over an intercostal space elicits a

louder sound than percussion over a rib. The chest of a young subject with elastic costal cartilages is more resonant on percussion than the chest of old age with ossified cartilages; and, in accordance with the same principle, the unsymmetrical chest associated with lateral curvature of the spine is, as a rule, unequally resonant on percussion, the flattened side being usually more resonant than the other.

Transverse Section of Chest, showing change of form resulting from Lateral Curvature of the Spine, the convexity of the Spine in the Dorsal Region being towards the left. The continuous line indicates the normal form of the Chest; the dotted lines show the deviation from the normal form, resulting from the Spinal Curvature.

It is sufficiently obvious that inattention to the various results of lateral curvature of the spine which have here been referred to may lead to serious practical errors. I have seen several cases in which flattening under one or other clavicle, the result of spinal curvature, had been erroneously attributed to a tuberculous or pneumonic deposit in the apex of the lung. We have seen, however, that the flat side in these cases is usually more resonant than the other; while, on the contrary, when the flattening beneath the clavicle is the result of an inflammatory or a tuberculous deposit in the apex of the lung, there is usually diminished resonance over that part.

I saw lately a gentleman fifty years of age, who for the last twenty-five years has been, as I think erroneously, supposed to be suffering from tuberculous disease of the lungs. During that period, he has been troubled with winter-cough and expectoration; but he has usually been free from cough in the summer. He has several times had slight hæmoptysis; but he does not lose flesh, and there is no family history of tuberculous disease. He has a large barrel-shaped chest, with very little thoracic movement in respiration. He is round and high-shouldered, the left shoulder being higher than the right. There is lateral curvature of the spine, the convexity in the dorsal region being towards the left. With this, there is the usual unsymmetrical chest, the left side being rounded at the back and flattened in front, while the right presents the reverse condition. The flattening under the left clavicle is, at the first view, highly suggestive of a deposit in the apex of the lung; and for this supposed deposit he had been perseveringly applying iodine. But then it was to be observed that the resonance on percussion beneath that clavicle was decidedly greater than over the corresponding part on the right side; and, while the respiratory and vocal sounds beneath both clavicles were normal, there were moist and loose râles over both lower lobes. I inferred that the case was one of emphysema with recurring winter bronchitis, and that there was no evidence of tuberculous disease of the lungs. I think, too, that more than one eminent physician, who had pronounced him tuberculous, had been misled partly by attaching too much importance to the hæmoptysis, which is a very common result of emphysematous bronchitis, but mainly by misinterpreting the flattening beneath the left clavicle.

I saw lately a young lady who, to her mother's great alarm, had been supposed to have a tumour in front of the chest on the right side. There was lateral curvature of the spine, the convexity towards the left in the dorsal region; and with this there was the usual unsymmetrical chest. There was but little subcutaneous fat, so that the ribs could be plainly seen and felt; and, in addition to the general roundness of the chest beneath the right clavicle, the second costal cartilage was rather more prominent than the third. This was the explanation of the supposed tumour in front of the chest.