Reprinted from Annals of Internal Medicine, Vol. 30, No. 4, April, 1949
Printed in U. S. A.

AN HISTORICAL REVIEW OF THE PHYSICAL EXAMINATION OF THE CHEST *

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There is no part of medicine that offers so great a challenge to the medical mind as diagnosis. Early diagnosis detects disease when the least harm has been done to the patient and makes treatment more simple and cure more probable. Then too, if the disease is infectious, it permits early application of public health measures for the protection of others.

Any method of examination which adds to the earliness or the certainty of diagnosis is a valuable contribution to the welfare of man.

For a long time it was thought that disease was a general disorder involving the whole organism. However, in 1761 Morgagni [1] published his book on pathological anatomy, and Auenbrugger [2] devised percussion for the examination of the heart and lungs. It was thus shown both pathologically and clinically that some illnesses had their seat in organs.

It is nearly two centuries since the physical examination of organs within the chest was made possible by Auenbrugger through percussion, and a century and a quarter since their examination by auscultation was made possible by Laennec and the stethoscope.

There is no record of percussion having been used in the examination of the organs of the chest prior to 1754, when Leopold Auenbrugger of Vienna struck the normal chest of a patient with the tips of his fingers and noted a resonant sound. However, Skoda states that the abdomen had been previously percussed to determine the presence of gas in the bowel. Auenbrugger found that a stroke over the heart gave a dull sound and over a normal lung a resonant sound. However, he also noted that when the lungs were diseased a different sound was elicited. He found, on post mortem, that those areas of the lungs over which he had obtained a dull note on percussion contained less air than normal and that those which showed hyperresonance contained more air than normal. After seven years of percussion and noting sounds and comparing clinical and postmortem findings, Auenbrugger in 1761 published *Inventum Novum,* a small book of 95 pages which contained the results of his clinical observations, describing resonant, dull and tympanitic notes—the conditions responsible for all of which he had proved post mortem.

The following quotation from *Inventum Novum* is taken from a translation published in Castiglioni's History of Medicine: [3]

"I. The thorax of a healthy person sounds, when struck.

"II. The sound thus elicited from the healthy chest resembles the muffled sound of a drum covered with a thick woolen cloth or other envelope. . . .

* Received for publication March 13, 1948.

"XII. If a sonorous part of the chest struck with the same intensity yields a sound deeper than natural, that part is diseased where the note is deeper.

"XIII. If a sonorous part of the chest struck with the same intensity yields a sound duller than natural, disease exists in that part. . . . I have opened the bodies of many dead from this disease (consumption) and I have always found the lungs firmly bound to the pleura, and the lobes on that side where the obscure sound has existed callous, indurated, and more or less purulent."

Auenbrugger is supposed to have obtained the idea of percussion from seeing his father, who was an innkeeper, tap on wine barrels to estimate their contents. However, the fact that he lived in Vienna at the time of Gluck and Haydn and was himself a devotee of music might also have had much to do with it. He not only was a distinguished physician but also entered into the cultural life of Vienna. He was a Styrian, born in Gratz. In 1784 the Emperor gave him a patent of nobility. Auenbrugger wrote an opera, *The Chimney Sweep,* which would indicate that he had a high appreciation of musical tones.

Van Swieten was head of Viennese medicine and was greatly admired by Auenbrugger. He and his successors, de Haen an Stoll, taught the necessity of studying the patient. DeHaen introduced the thermometer into Viennese medical circles. However, not one of these clinicians saw that Auenbrugger had opened new vistas in medicine. In their writings on diseases of the chest not one of them recommended percussion, but Stoll mentioned it in his Aphorisms. This caused Auenbrugger great disappointment, but he said he expected such treatment of his discovery and did not let it dissuade him from continuing his observations.

Although percussion had within it the possibility of furnishing a better understanding of chest diseases, physicians were slow to adopt it, and Auenbrugger died without its being accepted.

About 50 years later Corvisart, finding little progress in France, turned to Viennese medicine, which was in the ascendancy at the time. He learned of percussion through his translation of Stoll's Aphorisms. Percussion had not come to his attention in Paris. In fact, it was all but forgotten. But Corvisart on learning of it was immediately impressed with its possibilities. He used it daily in practice and did everything in his power to induce others to use it. In 1808 Corvisart [5] brought out an elaborate translation of *Inventum Novum,* expanding it from its original modest 95 pages to 440 pages.

On hearing that Corvisart diagnosed diseases of the chest by examining that part of the body direct, Napoleon, who was ill, said: "Send him to me." Corvisart came and tapped Napoleon's chest with his fingers and made a diagnosis. This so impressed Napoleon that he appointed him his personal physician. It was from this vantage point that he was able to revive percussion and establish it for all time, but not without great opposition on the part of his confreres.

As professor of practical medicine in the College of France, he taught that diagnosis depends on accurate observation.

Corvisart not only revived the almost forgotten percussion but stimulated his distinguished pupil, Laennec, to observe and examine. Laennec was a student of acoustics and also a musician (player of the flute), therefore it was not unnatural that his attention should be turned to percussion and auscultation. Laennec not only felt the pulse and percussed the heart, but he listened to the heart sounds with his ear to the chest. This was often disagreeable—sometimes to the physician on account of the lack of cleanliness; sometimes to the patient on account of modesty. It is said that 15 days before he discovered the stethoscope he read a paper on immediate auscultation before the Societe de L'Ecole, which not only shows his great interest in auscultation before he discovered the stethoscope but also indicates the suddenness of his discovery. This was in February 1815. It is said to have been the first paper recorded on *immediate* auscultation, and yet *mediate* auscultation was just about to be born.

The story of the discovery of *mediate* auscultation is the following. Laennec had a very obese woman patient whose heart sounds he could not hear clearly. The patient was not only obese but modest and he could not bring his ear in contact with the area of the heart sounds. He saw some boys playing with timbers lying in the courtyard of the Louvre. One of the youngsters tapped on the end of a long beam and another put his ear to the other end and could hear the transmitted sound. This gave Laennec an idea. On arriving in the presence of his patient he made a roll of paper, put one end over the site of the cardiac impulse and with his ear to the other end heard the sounds with unusual distinctness. He then listened to the lungs and heard the respiratory sounds with clearness and satisfaction. In this manner the stethoscope was discovered and Laennec was able to report the first description of the sounds heard on respiration.

For four years Laennec worked, observing patients and, like Auenbrugger, when possible compared his findings with postmortem results. In 1819 he published his observations on the use of the stethoscope in the study of diseases of the heart and lungs. In this he described the respiratory sounds as he heard them in normal chests and in the various diseases of the lungs.

Laennec's book [6] *De L'Auscultation Médiate* (Paris 1819), like *Inventum Novum* of Auenbrugger, was given a poor reception. Many saw in the stethoscope no advantages over previous methods of examination and feared that mechanical instruments would ruin clinical observation. What would they think of today's armamentarium?

Those who refused to see value in it were those especially who had not seen its demonstration, but those who witnessed Laennec's demonstrations were convinced. The numbers of his pupils were many, and the French school prospered. Skoda of Vienna and Piorry of Paris both adopted and enthusiastically demonstrated percussion and auscultation. Piorry [7, 8] was the first to use the pleximeter. He also taught the value of the resistance felt by the percussing fingers, although Corvisart had the honor of being the first to note this phenomenon.

Physical diagnosis based on percussion and auscultation was gradually established. It was fortunate to have as its sponsors, Auenbrugger, Laennec, Corvisart, Piorry and Skoda.[9] In two of these the spark of originality had lighted the way to a newer clinical conception, and the others were far-sighted enough to recognize the value of these discoveries to medicine and the world.

Medicine had made great advances in the 50 years following the discovery of percussion and should have been better prepared to receive the work of Laennec, yet it was received only half-heartedly. But it was saved by the enthusiasm of a few great teachers who came in contact with Laennec and others who followed him.

Many physicians from different parts of the world came to Paris to study with Corvisart and Laennec. This made Laennec's work too arduous for his frail body. He was suffering from tuberculosis and was compelled for a time to give up his teaching and to repair to his old home in Brittany. His enthusiasm, however, compelled him to return to his work sooner than he should have done. He observed, he taught, he wrote; and, in 1826, just after finishing a second book [10] Laennec fell seriously ill and soon thereafter died.

Laennec stated: "Immediate auscultation, however, should not cause us to forget the method of Auenbrugger; on the contrary, it confers on it an importance altogether new, and extends its use to many diseases in which percussion alone affords no indication." He was exceedingly optimistic about the readiness with which physicians could master auscultation. He stated: "It is, however, sufficient to have observed a disease two or three times to know how to recognize it with certainty."

Laennec stated that immediate auscultation was tried by Hippocrates but there was no evidence that from the time of the Father of Medicine to his time anyone had repeated the experiment.

Laennec paid little attention to expiration. He was particularly engrossed with the idea that he was able to hear the air pass down through the bronchi and into the alveoli. Starting with the trachea, he spoke of tracheal breathing; he followed, in his mind, the air through the bronchi and called that *bronchial breathing*. Then he assumed that the air cells were opening and called that *vesicular breathing*. Combinations of the latter he called *broncho-vesicular*.

He assumed that the murmur which he heard originated in the pulmonary tissues and bronchi immediately under the stethoscope. This is partly true. The pulmonary tissues do have a part but not the only part in the production of the respiratory murmur, and also a part but not the only part in its transmission to the ear, as may be inferred from the murmur produced and transmitted over the abdominal muscles in abdominal breathing.

He described the finding of *bronchial breathing,* normally, over the large bronchi near their bifurcation; and *vesicular,* in the axilla near the surface of the lungs at the end of the bronchi, particularly, where they passed into air cells. Bronchial breathing heard elsewhere he considered pathological; likewise the failure to find vesicular breathing where it was expected to be. He reasoned that when the air cells are filled with exudative material the only sound heard must be that of the bronchi, hence pneumonia and tuberculous consolidation cause bronchial breathing. He noted the increased intensity of the spoken voice, *bronchophony* in case of infiltration of the lung; and the transmission of distinct syllables, *pectoriloquy,* in case of cavity. It must be remembered that many of his patients suffered from far advanced tuberculosis, with cavitation. The recognition of early lesions is a recent accomplishment.

Laennec also gave us the classification of râles which has come down to the present with little alteration: "(1) the moist crepitant râle, or *crepitation;* (2) the mucous or *gurgling* râle; (3) the dry sonorous râle, or *snoring;* (4) the dry sibilant râle, or *whistling;* and (5) the dry crackling râle with large bubbles, or *crackling.*"

In 1834, Beau [11] suggested that the air passing through the glottis was the cause of the respiratory murmur which was modified as it pressed against the walls of the trachea and bronchi and entered the alveoli. He seems to have accepted Laennec's description of the sounds, differing only as to their origin.

Laennec's description of the respiratory sounds and Beau's suggestion as to their origin have been accepted, taught, and described in textbooks until the present time.

Discoveries which carry the mind into fields of thought alien to those prevailing at the time, if not accepted at once, may be lost. Percussion had no outstanding champion until Corvisart took it up 50 years after Auenbrugger had published his discovery. As Corvisart had been obliged to teach himself percussion, so Skoda of Vienna taught himself both percussion and auscultation; and in 1839 published a Treatise on Percussion and Auscultation—78 years after Auenbrugger had published his *Inventum Novum* and 20 years after Laennec's publication on stethoscopic examination of the heart and lungs. Skoda's understanding of auscultation and percussion and the acceptance of it by his pupils may be envisaged by the fact that his book went through six editions between 1839 and 1864. Nevertheless, in spite of the fact that percussion and auscultation received the benefits of the prestige of Corvisart, Piorry, and Skoda, they were slow in receiving general recognition.

But once accepted, the remaining portion of the nineteenth century became distinctly the era of physical diagnosis in diseases of the chest, based on percussion and auscultation. Physicians improved their practice by comparing their findings with the postmortem results furnished by the rapidly developing school of pathologists, beginning with Morgagni and followed by Rokitansky and Virchow in the nineteenth century.

In case of the examination of the heart and lungs, in the nineteenth century, inspection gave little direct information to the physician. The use of inspection was confined to the general appearance of the patient and to abnormalities in form and movement. Palpation was confined largely to eliciting the heart-beat, the thrill of murmurs, vocal fremitus, the thrill of large bubbling râles in lung cavities, and large rhonchi, and enlarged glands. Laennec noted that under certain conditions these large râles produce sounds resembling "a drum or a carriage rumbling over a pavement . . . accompanied by a vibration very sensible to the hand and indicative of its proximity."

It was not until after the beginning of the twentieth century that the clinician could use inspection and palpation as major methods of diagnosis of the organs within the chest. By this time the roentgen-ray had been discovered which, while being our greatest single method of examining the chest, has all but proved the fears of those who saw danger to methods of observation in the mechanical wooden stethoscope used by Laennec. However, it must be remembered that mechanical devices can not displace the senses in securing diagnostic data. The patient is an anatomical, physiological and emotional being, in whom departures from normal can be only partly detected by laboratory technics. The mind is necessary to interpret laboratory results and to fit them to the patient's reactions. The more accurate the physical examination made by the clinician the more evident will be the necessity of controlling roentgen-ray findings by data obtained by the eye, the ear, and touch.

When I studied in European clinics in 1894, the wooden monaural stethoscope was in general use, and not infrequently the ear to the chest was used. I do not recall a single European clinician who used a binaural instrument. Percussion was interpreted largely by sound instead of resistance. Different teachers had their own favorite pleximeters, some of wood, others of ivory, and still others of metal. Most, however, appreciated the fact that the best pleximeter was the finger, the differences in perception being of more value than sound. Likewise all kinds of percussion hammers were used—large and small—with little or much rubber on the striking surface. It was taught that light percussion would detect densities near the surface of the chest wall but that heavy blows were necessary for infiltrations deep in the chest. I well remember a professor in Berlin who used finger-finger percussion and could percuss for an entire amphitheater of students, the sound being so loud that it could be heard generally. Such blows throw the entire chest and all structures in the direction of the blow into vibration, cause confusion in interpretation, and may completely obscure the dullness caused by slight pathological changes.

On my first trip to Europe I was instructed in the usual textbook teachings on physical examination, the same as in Cincinnati. However, these were the smallest part of what I learned. I learned something of what the great men in medicine were doing and thinking, and how they were interpreting their findings in terms of clinical disease. Even with their limited measures they did not hesitate to face the pathologist in case of post mortem.

I heard Senator lecture for one hour on what could be determined of a patient's past illnesses, present condition and future possibilities by inspection. I was more than impressed; I was astounded. How could he see so much, was the question which perplexed me.

In 1895, soon after my return from Europe, I was forced to leave Cincinnati and go to California on account of my wife's illness; and again to leave Los Angeles, our only city in Southern California at that time, with its 60,000 inhabitants, and go to Monrovia, a town of 600 people, in the foothills of the Sierra Madre mountains, because it was a more favorable climate. I had no special knowledge of tuberculosis, but my wife and most of my patients were suffering from it, so I was forced to teach myself. I was particularly anxious to know how to examine chests. I read my textbooks with great care. I tried to apply what I read to the chests that I had to examine. In auscultation I had great difficulty. I could not find the 5–3 or 3–2 ratio of inspiration to expiration given in the books. I found the sounds more nearly equal. I thought I must be wrong. It must be due to my inability to examine, but try as I would I could not make my findings correspond with textbook teaching. It took time for me to think the textbooks were inaccurate, but why should there not be error in textbooks? Everything is not discovered at one time.

One day I put my hand on a patient's back and struck a light blow on the front of the chest—so light that it was scarcely audible—and felt it perfectly through the chest. I then knew that percussion was more delicate than we had believed it to be and began to use a very light stroke—only a tap.

After proving to myself that teachings regarding the relative length of inspiration and expiration were wrong and after demonstrating that a light stroke could be felt clear through the chest, I one day placed my stethoscope over the biceps and noted a sound somewhat like the respiratory sound. I then came to the conclusion that part of the respiratory murmur might be muscular. I was strengthened in this opinion when I listened over the abdominal muscles and heard a murmur, weak but still similar to that often heard over the chest. My confusion was deepening. My own observations were directing me away from my textbooks and teachers.

Further study showed me that inspiration lasts during the entire inspiratory phase of respiration and expiration throughout the entire expiratory phase. It was just one more step to see that the respiratory sounds are caused by all factors in the respiratory mechanism that produce sound vibrations. The strange thing is that it took nearly fifty years after getting my first hint before I was able to take this step and fully satisfy myself that the respiratory murmur is composed of all factors belonging to the respiratory mechanism which are capable of producing sound vibrations.[12, 13]

It is evident to anyone conversant with the facts of physiology that the respiratory murmur can not be caused by the air rushing through the larynx and dilating the bronchi and air cells, because there is no rushing of air after it enters the trachea. The tidal air which amounts to some 500 to 700 c.c., on entering the air passages, is met by the residual air which nullifies its force. Thereafter the air enters the small bronchi and air cells by diffusion.

If the respiratory murmur is not caused by the action of the air column upon the bronchi and air cells, what would be a satisfactory explanation for the sounds heard in the different lung areas? I suggest that the respiratory murmur is caused by sound vibrations originating in all portions of the respiratory mechanism, and that they vary in quality according to the degree to which the sounds originate in air-containing and non-air-containing tissues.

Non-air-containing tissues are dominant in the upper portions of the lung in the region of the bronchi near the hilum anteriorly and in the interscapular space posteriorly. Here large bronchial and vascular trunks and a relatively small proportion of lung tissue are covered by a relatively large mass of musculature and the least elastic portion of the bony cage. Movement is restricted. In this area the murmur has been called *bronchial*. On the other hand, air-containing tissues are dominant in the production of sound in the outer and lower portions of the lungs. Here is a large proportion of pulmonary tissue and the bronchial and vascular trunks are relatively small and covered by a minimum of musculature and the most elastic portion of the bony cage. Here movement is relatively free. In this area the murmur has been called *vesicular*. In the presence of infiltrations the relative amount of non-air-containing tissues is increased, movement is restricted, and so the murmur takes on the so-called bronchial quality.

With this new conception of the respiratory murmur, auscultation becomes a method of studying the respiratory mechanism and the manner in which disease affects changes in respiratory movements and in the production and conduction of sound vibrations. It connects it intimately with inspection, palpation and percussion.

While studying physical examination I put to test my powers of inspection and palpation and tried many different types of percussion. I found that if we depend mostly on sound in percussion, the difference may be exaggerated by striking the chest with many different objects, such as a small rubber tube or a lead pencil. But these were only passing observations. I also outlined organs by palpatory percussion. However, I preferred to interpret percussion according to the sensation conveyed to the finger rather than sound. I learned to feel the effects of the percussion stroke and preferred the fingers for both hammer and pleximeter, using a very light stroke. It was just one more step to detect different densities by palpation, using no stroke at all; and this was soon proved.

At Monrovia I was isolated. I had no access to a library, but I could not get away from Senator's remarkable exhibition of inspection. So when

I began to teach myself to examine a chest, that remarkable lecture of Senator was always urging me to observe.

I could see the difference in movement of the chest wall and thought that differences over an infiltrated area as compared with a normal chest should also be felt. I palpated as well as percussed. After 14 years' trial I found that there was something felt over pathologic chests which was not noted over normal chests. Then one day I made an unexpected but important observation.

I was examining a patient who had marked infiltration at the right apex, with adherent pleura. Palpating over the first intercostal space I found a resistance greater than normal. I attributed it to the muscles. They seemed to be in spasm. I persisted and a few months later [14, 15, 16, 17, 18, 19] was able to demonstrate not only an increased density in the lung but a muscle spasm as well. I believed that I had observed the same spasm in inflammation of the lung as is found in appendicitis, inflammation of the gall-bladder and gastric ulcer.

I followed this lead carefully. I began to look for muscle tension in every patient whom I examined, and after a short time found that the lungs reflect in the muscles of the shoulder girdle—the sternocleidomastoideus, scaleni, levator anguli scapulae, acromial portion of the trapezius—and the crus and central tendon of the diaphragm. I found that all those muscles that are visible show spasm when the disease is active and degeneration when it is chronic or healed. I assumed that the same is true with the crus and central tendon of the diaphragm.

I also felt that it was not possible that the lessened motion on the side of the diseased lung in early cases could always be caused by the small infiltration present. I assigned it partly to the effect of spasm of the sternocleidomastoideus and scaleni above and the crus and central tendon of the diaphragm below interfering with the respiratory movement.

In my first observation I probably was feeling both the density of the underlying infiltrated pulmonary tissues and the spasm of the intercostal muscles caused by the underlying pleura. But the important fact was that I recognized increased tension and so persisted until I had found both the pulmonary and pleural reflexes and was able to differentiate them by the segments of the cord in which they were mediated, and had proved the ability to outline the heart and detect densities in the lungs by palpation.

I soon found that the muscles of the shoulder girdle and the crus and central tendon of the diaphragm receive their nerve supply from the midcervical segments of the spinal cord, particularly the third, fourth and fifth, and the pleura from the thoracic segments.

Sometimes, when active tuberculosis is present, one can see the muscles standing out in increased tension, but it is detected better by palpation. One can also see the lessened motion of the hemithorax which I have suggested might be partly caused by spasm of the sternocleidomastoideus and scaleni above and the crus and central tendon of the diaphragm below. Aside from the spasm I found that the muscles, subcutaneous tissue and skin innervated by nerves from these same cervical segments show atrophy when the disease in the lung has become chronic or healed, and the skin and subcutaneous tissues overlying acute pleurisy atrophy when the pleural inflammation continues for any length of time.

The pleural motor reflex as shown in the intercostal muscles seems to be coextensive with the pleural inflammation. Both pleural motor and trophic reflexes are produced by the intercostal nerves which mediate in the same thoracic segments of the cord that receive the afferent impulses from the pleura.

The pleural trophic reflex, like the pulmonary trophic reflex, is of great importance diagnostically. It is not possible to differentiate the reflex pleural atrophy of the intercostal tissues from the degenerations which Coplin [20] has described as being caused by direct extension of the pleural inflammation to the intercostal structures; in fact, they are probably the same.

Inflammation in the lungs and pleura is easily differentiated reflexly because the pulmonary motor reflex is expressed in the muscles of the shoulder girdle (the accessory muscles of respiration) and the diaphragm; and the pleural motor reflex in the intercostal muscles. The atrophy caused by inflammation in the lung, aside from that in the muscles, involves the skin and subcutaneous tissues above the second rib anteriorly and the spine of the scapula posteriorly, while atrophy from pleural inflammation may involve the intercostal structures and subcutaneous tissues of the chest anywhere below the second rib anteriorly and the spine of the scapula posteriorly.

Our knowledge of the pulmonary and pleural reflexes offers aid in interpreting râles. While squeaks and wheezes are definitely signs of bronchial obstruction, the so-called moist râles are not so easily interpreted. They are not always caused by moisture in the air passages, nor are they always indicative of the presence of active tuberculosis when heard at the apex following a quick inspiration after exhalation and cough, as usually taught.

Râles which can not be differentiated from the so-called moist râles may be heard over the areas of pleural atrophy. Although at or near the apex they can not be differentiated from pulmonary râles, over the lower portion of the thorax their nature is more definite. Like the râles in tuberculosis, they are not always present. They are frequently found in patients with a history of previous pleurisy with effusion. I have known them to persist for years—in one case more than 40 years. The presence of the pleural trophic reflex without the pulmonary motor reflex is the key to the diagnosis. The roentgen-ray may show no pulmonary involvement, and there may be no history of recent pulmonary disease. The patient may complain of pain, for which a diagnosis of intercostal neuralgia is often made.

The discovery of the reflexes from the lung permitted me first to point out the important physiologic fact that while the lung receives its sympathetic nerve supply from the upper five or six thoracic segments, the midcervical segments of the cord contain the centers in which the afferent nerves which course in the pulmonary sympathetic system mediate reflexes in the somatic structures—muscles, skin and subcutaneous tissues. In order to do this, stimuli must be conveyed from the lung to the upper thoracic segments, thence upward over intracentral paths to the midcervical segments, thus differing from other important viscera.

The pleural reflexes follow Sherrington's law [21] to the effect that each afferent impulse finds in the segment of the cord which it enters an efferent neuron with which it will mediate a reflex most readily; but to explain pulmonary reflexes it was necessary to suggest a modification of this law [22] as follows: *Each afferent impulse from the lung finds in that segment of the cord with which it is embryologically connected an efferent neuron with which it will unite most readily to produce reflex action.*

I also found that the afferent fibers in the vagus of the parasympathetic nervous system mediate with efferent neurons of the cranial nerves in case of the facial muscles, the Vth, VIIth and IXth in case of the tongue. The atrophy of the facial structures and tongue is best seen in chronic largely one-sided destructive pulmonary lesions and sometimes following thoracoplasty.

While pursuing the study of these reflexes, I one day (as previously stated) noted that I could detect the borders of the heart by palpation. It did not seem possible that an organ deep within the chest cavity could be felt. But by continuing my search I found that I could not only outline the heart by palpation but I could detect the difference between the density of normal lungs, infiltrated lungs, and distended lungs such as we find in asthma and emphysema. This could be detected by pressure so light that it barely indented the skin, so I called the method *Light Touch Palpation.*[16, 23] This gives a new method whereby one by palpation can outline the heart and differentiate various pathologic conditions in the lung and pleura by differences in density. Furthermore, it proves the validity of very gentle percussion.

During the nineteenth century physical diagnosis of organs within the chest was based only on percussion and auscultation. In the twentieth century, now that the reflexes from the lung and pleura have been described and the ability to palpate structures—both superficial and deep within the chest—has been discovered, physical examination becomes more accurate, and inspection and palpation assume major importance.

Physical examination of the organs within the chest has now been enriched, and the physician has at his command methods as accurate as his perception and interpretation of sight, hearing and touch can make them. Whether the disease is active or inactive can be determined by sight and touch. Furthermore, findings can be studied in connection with roentgenograms of the chest which afford a valuable method of recording the living pathology of these structures.

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