months, and having convalesced, went about for three weeks, when pain appeared at the umbilicus, which was not increased after taking food. She kept about for three weeks, when she was compelled to take to her bed. She then had diarrhoea, without much pain or tenesmus, and for three weeks had vomiting, which, latterly, had been extreme. When admitted, she had an anxious face, and was very thin. There was pain at the umbilicus, and upwards along the sternum, and across the epigastrium. On February 5th, the bowels were opened, and the motion natural. She had no vomiting. On the 8th, she vomited after eating bread and butter. On the 11th, the pain was constant; the bowels were opened naturally; there was no mucus in the motion. On the 14th, the pain was constant, but aggravated in paroxysms, with vomiting. On the 18th, compound colocynth pill was given, which operated quickly, and diarrhoea set in, which lasted until the 22nd. On March 7th, at 8 A.M., sudden intense pain arose, followed in one hour by vomiting. Morphia-injections and poultices relieved the pain, but the patient was collapsed at 2, and died at 5 P.M. A *post mortem* examination was made (88). The peritoneum contained much thin, purulent fluid, and one coil of bowel looked of a yellow colour. Many coils were greatly distended. After removal, when laid open, they measured five inches and a half. Below the umbilicus, an intussusception was seen of the small intestine, two or three feet above the cæcum. On this being laid open, it was found that the lower end of the intussuscepted mass had a solid tumour hanging from it by a short thick pedicle. It was of the shape of a chestnut, of a dark purple colour. No adhesions had occurred between the entering and returning layers of the intussuscepted part, which were greatly congested for about two feet. The polypoid tumour was made up of fibrous tissue.

CASE XXI. *Intussusception of Diverticulum Ilei; Peritonitis; Laparotomy.*—James C., aged 22, was admitted on July 24th, 1874; laparotomy was performed on the 25th; he died on the 27th. He had been healthy until four days before admission, when, after eating fish, he had abdominal pain and vomiting, which became worse, and his bowels ceased to act. When admitted, he was vomiting a brown fluid, the abdomen was tender, but not tympanitic. The urine was scanty; temperature 99°; pulse 140. There was no tumour to be felt. On the 25th Mr. Davies-Colley opened the abdomen, under the carbolic spray; and, after twenty minutes' search, found an intussusception, which he drew out. A copious motion followed, but the patient sank. At the necropsy (273) the peritoneum was injected. The small intestines were distended. At the distance of 2½ feet from the cæcum was a diverticulum; the intestine at the part was flaccid and congested. The tip of the diverticulum was still invaginated; and there was no doubt that the invagination of the diverticulum had been the cause of the intussusception, by acting as a polypus.

CASE XXII.—A man, aged 44, came into Guy's Hospital in 1877, with symptoms of peritonitis following obstruction. He died, and at the *post mortem* examination, an intussusception of the rectum was found, due to the forcing down, by the bowel, of a mass of colloid cancer, attached to the end of the entering portion.

The process by which such intussusception is formed is the same as that which expels a rectal polypus through the anus, and likewise gives rise to prolapsus recti.

By way of conclusion, I would lay down the following as rules of practice.

1. Laparotomy should be undertaken as soon as the diagnosis of acute intestinal strangulation is made. There should be no delay allowed for the formation of a specific diagnosis of its cause. It should likewise be proposed in all cases of acute intussusception, and of chronic, which have failed within three, or, at the most, four days, to be relieved by other treatment.

2. In all operations of laparotomy, it is to the cæcum that the surgeon should first advance, since it is from it he will obtain his best guide. If this be distended, he will at once know that the cause of obstruction is below; if it be found collapsed, or not tense, the obstruction must be above. Adhesions or bands, are, moreover, more frequently near to, or associated with, the cæcum, than with any other part of the intestinal tract. It is also in the right iliac fossa that the collapsed small intestine, in cases of acute strangulation, is usually to be found; and, with this as a starting point, the surgeon will have less difficulty in tracing up the intestine to the seat of strangulation than if he begins at a distended coil, when it will be a matter of chance whether he travels away from or towards the special object of his search—the seat of obstruction.

3. In a laparotomy, when the strangulated coil of bowel is gangrenous, it should be brought out of the wound, and the gangrenous knuckle resected. The proximal and distal ends of the resected bowel should then be stitched to the edges of the wound, and an artificial anus established.

4. Nélaton's operation of enterotomy should be undertaken in all cases of intestinal strangulation, when laparotomy is rejected or seems inapplicable, as well as in cases of intussusception in which the invaginated bowel cannot readily be released. It should be performed in the right groin, or, rather, right iliac fossa.

5. If laparotomy succeed, the cause which called for it is removed, and the normal action of the bowel is restored. If resorted to early, and as a rule of practice, it is probable that it would be more successful than the treatment, by opium, inflation, or purgatives, which has hitherto been in vogue.

ON THE CONDUCTION OF PHYSICAL SIGNS IN DISEASES OF THE LUNGS.

Read before the Medical Society of London.

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IN the case of diseases of the heart, it is universally recognised that the physical signs by which certain morbid conditions are detected, are conveyed to varying distances from the site of their origin, and are transmitted by the different structures in the vicinity, and that the tissue of the lungs themselves takes its share as a conducting medium. Thus, it is well known that a cardiac murmur, if sufficiently marked, will be audible not only along the line of the heart and great vessels, but also over a certain region of lung, adjacent to the heart; and that, in the case of a very loud murmur, the sound may be heard over the whole of the pulmonary area. Hence it is a well-established clinical fact, that lung-tissue is a fairly good conductor of sounds developed by morbid conditions.

As far as my experience has gone, I have seen reason to believe that in the case of diseases of the lungs themselves, it is not so generally recognised that the physical signs which exist may be detected at a distance from the spot where they originate. It has repeatedly fallen to my lot to meet with instances where this fact has not been duly appreciated; and, I may observe, that it is not usually insisted upon in text-books. I have, therefore, ventured to bring before you, to-night, the subject of the conduction of physical signs in pulmonary disease, in the hope that it may be of some service to draw attention definitely to a point, the practical importance of which will be readily recognised.

I proceed, then, briefly to illustrate the following propositions.

1. Physical signs due to disease of a limited portion of lung may be conveyed by the surrounding tissue, so as to be recognised at a distance from the site of the lesion; as in front, where the disease is at back of the chest; in the lower part, where the disease is in the upper; or over the sound lung, where one lung only is affected.

2. It is, consequently, as important to trace to their origin the physical signs dependent upon lung-disease, as it is to follow out those of a cardiac lesion.

The first case in which my attention was definitely drawn to this subject was one which occurred at University College Hospital during my student-days. A patient, with the signs of left pneumothorax—tympanitic percussion-note and the usual auscultatory phenomena—presented the same signs over the upper part of the right side of the chest, and it was therefore supposed that there existed a limited pneumothorax on the right, as well as general pneumothorax on the left, side. After death, it was found that there was no air in the right pleura, but that the apex of the lung was consolidated, and had conveyed over to the right side signs derived from the left; just as a solid tumour in the thorax may transmit physical signs produced in the lung-tissue with which it lies in contact.

Since that time, I have frequently met with illustrations of the same fact. I will briefly give a few examples.

A patient was admitted into the Bristol General Hospital with acute lobar pneumonia of the left base—the usual signs being present. There was, in addition, tubular breathing over the right base, so marked as to have led to the diagnosis of consolidation of this base also. It was pointed out, however, that dulness and increase of vocal fremitus were absent on the right side, and that vesicular breathing existed, through which the tubular was heard. The patient died, and the *post mortem* examination proved that consolidation existed at the left base only.

A man was admitted into the hospital, with the right pleura almost full of fluid. Bronchial breathing existed near the spine on the affected side, and was conducted over to the sound side, as far as three inches

from the middle line; while the exaggerated breathing of the sound side was conveyed for a similar distance over the area of effusion. The question arises, how far, in such an instance as this, the chest-wall itself does not act as the conducting medium?

In a case of right apex pneumonia, there was silence over the affected area, and tubular-breathing was nowhere heard, except distantly over the sound lung, close to the middle line, in front and behind.

In a case of consolidation, with cavity at the right apex, where, in the examination of the chest, the stethoscope was placed first upon the left side, amphoric breathing was so loudly heard here, as to give rise to the impression that there was a cavity in this, the unaffected side—whereas, further observation proved that the sound was merely conducted over from the right apex.

In a man with chronic bronchitis and emphysema, sibilant rhonchus was detected over the left back, and was believed to be localised there, until attention was called to the fact that the sound could be traced over to its point of maximum intensity on the right side.

In a young man with phthisical consolidation of the right apex, high-pitched moist *râles* existed, which, both in front and behind, were plainly conducted to the *left* apex, diminishing in intensity until they became inaudible at a distance of about 2½ inches from the middle line.

In a patient with similar phthisical disease at the right apex, the high-pitched moist *râles* originating on the right side were distinctly heard over the first rib and space on the left, as far out as 3 inches from the middle line. What made the identity of the *râles* in this case especially clear was that towards the end of expiration they became synchronous with the heart-beat.

There is a group of cases of some practical importance, where sounds—rattling, snoring, gurgling, and the like—produced in the throat, larynx, trachea, or main bronchus, are conducted throughout the lung-tissue so as to be audible more or less over the whole of the pulmonary area; just as the voice-sound, originating in the larynx, is conveyed to the surface over the entire lung. I have, however, known a diagnosis of general bronchitis to be made in such a case. The distinguishing points of this condition are these: That the same sound which is heard over the chest is frequently audible before the ear is applied to the surface, and that on auscultation it is proved to be identical in quality over the whole area, diminishing only in intensity as the distance from its source increases.

As a type of this group, may be taken the stridulous breathing of laryngeal obstruction. Every one is familiar with the way in which the stridulous sound produced in the larynx is conveyed over the whole of the pulmonary area, so that the normal vesicular breathing is more or less completely masked. Here there is no suspicion of any source for the sound other than the larynx, although it is so clearly heard over the whole chest.

A similar conduction of sound often obtains in cases of bronchial asthma. One and the same cooing or whistling sound is heard clearly and distinctly predominant over a considerable area. When this is the case, the obstruction must be due to narrowing of one definite limited portion of bronchial tube only, and not to a general contraction of all the tubes over the given area; for did such a general narrowing of the air-tubes exist, each tube would have its own note, dependent upon its calibre (like the separate pipes of an organ), and the result would be the general chorus of sonorous and sibilant rhonchi heard in other cases of asthma and in a typical case of bronchitis in the dry stage.

The physical signs which are most liable to conduction are those which are recognised by auscultation; and, of these, chiefly altered breathing and *râles*, moist and dry. Friction-sound is conducted to but a small extent, and alterations in vocal resonance do not appear to be very readily transmitted to a distance. Percussion may furnish occasional instances, as in a case to which I have referred. Friction-fremitus and altered vocal fremitus (except in some cases of pleuritic effusion), are limited to the immediate vicinity of the lesion to which they are due.

In the attempt to localise the physical signs of lung-disease, the guiding principles are the same as in the case of cardiac murmurs. They are as follows.

In conduction, a physical sign (1) retains its special quality; (2) loses in quantity directly as the increase of the distance from the lesion to which it is due.

In order to prove that a heart-murmur, heard at the apex, is identical with a murmur dependent upon valvular lesion at the base, it must be shown that the character of the sound, as to quality and duration, is the same at both apex and base; and that the intensity of the murmur steadily increases as it is traced upwards from the one point to the other. In the same way, in order to justify the conclusion that *râles* heard at the right apex, are due to disease of the left, it must

be demonstrated that the quality of the *râles* at the two apices is identical as regards pitch, duration, and rhythm, and that the sounds steadily increase in intensity as they are traced over from the right side to the left.

The readiness with which a sound is conducted from one part of a lung to another, or from one lung to the other, will necessarily vary with the state of the conducting tissue. Thus, if *râles* exist at one apex, and consolidation has taken place at the other, the *râles* will be conducted over more distinctly by the solid tissue than by the healthy lung; just as the heart-sounds are heard more loudly than normal at the right apex if consolidation exists. Hence the degree of conductivity possessed by the lung is in itself of value as an indication of the physical condition of the pulmonary tissue in the region to which any sound is transmitted.

From a practical point of view, the subject which I have thus briefly discussed is one of considerable importance. Unless it is fully recognised that physical signs audible over any portion of lung-tissue do not necessarily originate where they are heard, but may be conveyed from a distance—unless it is remembered that, in lung-disease, the auscultatory phenomena in particular must be followed out to their position of maximum intensity just as carefully as in the case of cardiac murmurs—unless this is borne in mind, the observer will be liable to fall into error, to mistake an unilateral pneumonia for a bilateral consolidation, a local obstruction for a general bronchitis, a phthisical affection of one lung for a condition implicating both.

THE PRINCIPLES OF ELECTRO-THERAPEUTICS.

Introduction to a Discussion in the Section of Pharmacology and Therapeutics at the Fifty-Second Annual Meeting of the British Medical Association.

By A. HUGHES BENNETT, M.D.,

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I HAVE responded to an invitation from the authorities of this Section, to open a discussion on electro-therapeutics, in the conviction that an inquiry into the subject is attended with so much inherent interest, that it demands no special effort on my part to enlist the sympathies of scientific physicians. I consider that the official act of this branch of the British Medical Association, in initiating an investigation into the question, will constitute an era in the history of electrical science as applied to medicine in this country.

In England, this department of therapeutics has not received from the bulk of the profession that consideration which it merits; and, although for a long period the public have anxiously anticipated substantial benefits from its revelations, they have appealed in vain to the majority of medical men. This is partly due to a want of knowledge of the properties and virtues of electricity, and of its methods of application; and, also, to an impression which very generally prevails, that there is something mysterious in its phenomena, that its benefits have been exaggerated, and that those who employ it in practice are not always deserving of the confidence of their professional brethren or the public. That there may have been some grounds for this adverse prejudice, I will not attempt to deny; but, of late years, electricity, in its applications to medicine, has so developed its resources, as to assume a scientific position well worthy of serious consideration.

Although other countries, and especially Germany, have been the pioneers in advancing this branch of knowledge, in recent times the works of Althaus, Poore, De Watterville, Waller, and others, have done not a little to save England from the reproach of totally neglecting the study of what must, sooner or later, be recognised as a valuable agent in the hands of the medical man. I look, then, upon the determination of the Therapeutical Section of this great Association, to investigate the subject, on this the inaugural meeting of its existence, as a sign that at last the labours of electro-therapeutists in this country are being appreciated; that their efforts to promote their science are no longer looked upon with suspicion or prejudice, and that a desire is felt that their doctrines should be expounded, and a knowledge of them more widely disseminated.

Electro-therapeutics, in its broad sense, may be defined as that science which deals with the study of electricity in its relations to the treatment of disease. This obviously comprises a vast and varied field of investigation, involving, as it does, an intimate acquaintance not only with numerous physical phenomena, but with the laws of life in health and disease. To attempt a complete disquisition on such a subject is, therefore, impossible. My object in now addressing you is