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BRITISH LARYNGOLOGICAL, RHINOLOGICAL, AND
OTOLOGICAL ASSOCIATION

PRESIDENTIAL ADDRESS

DELIVERED NOVEMBER 8, 1901

BY

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methods have been discovered in physical diagnosis, and advances have been recorded in therapeutics.

At the time I had the honour of delivering my first Presidential Address, the classical researches of Lister, which had revolutionized surgery, had been everywhere accepted. Pasteur, whose work had so largely influenced Lister, Koch, Loeffler, Hansen, and others, had still further impressed us with the enormous importance of the study of bacteriology in its relation to medicine and surgery—not only by way of diagnosis, but also in the possibilities of therapeutics. I ventured to bring before the Fellows of this Association some practical points in bacteriology, and of the study of the advantages in our special department, because at that time it was clearly beginning to be appreciated. No one can now read our text-books or journals or visit any clinic without seeing the practical results which have been derived, and everyone will bear testimony to the enormous change for the better in the diagnosis and treatment of affections of the nose, throat, and neighbouring organs. If I quote diphtheria as an example, it is not because it is an isolated one in the study of acute affections, but simply as an illustration of how much can be done by bacteriological examination to insure early diagnosis and more careful treatment at the beginning of a disease, even if we were still sceptical of the results of antitoxin.

As a result of my election to the Presidential chair, my thoughts naturally tended in the direction of some other subject suitable for the occasion, and it occurred to me that a consideration of some of the recent advances in physical science now occupying so much of the attention of the scientific world might be discussed with advantage, particularly if we think of how much has yet to be done in the treatment of chronic affections such as lupus, tubercle, and malignant disease. Think of the enormous stimulus which has been given to medical work by recent developments in physical and chemico-physical science. I am quite aware that there are many other influences at work in stimulating thought, for there is no collateral branch of science which can be ignored by the physician or surgeon. The study of human physiology and pathology will never be placed upon a satisfactory basis until we apply to them every known fact which we owe to the students of zoology and botany. Nevertheless, a glance at the huge physiological and pathological laboratories, daily increasing in every country, will convince anyone of the enormous influence which the study of chemistry and physics is at present exercising in clinical research.

It is for this reason that I have selected a limited portion of the subject for this address, and I trust you will bear with me if, in

referring to some recent discoveries in physical science in their application to medicine and surgery, I occupy your time in placing before you some thoughts and results of researches which, in common with others, I have been making in this direction. The view of the subject of which I will treat more particularly is how far physical science is likely to aid us in the treatment of such chronic affections as have been above referred to, and I shall make special reference to the effect of electrical currents of high potential in the affections of the upper respiratory passages.

Will you pardon me the digression if at this point I refer for a few minutes to some facts in physical science which have a bearing, although not directly, upon our work? The work which has immortalized Faraday kept men occupied throughout the greater part of last century in developing electrical science; but no one lately caused greater interest than Tesla when he first demonstrated his new methods of transforming currents. More recently, we had the famous discovery of Röntgen. The physical world was excited when he announced the X rays, in the hope that he had at last been able to demonstrate the existence of waves in ether other than the transverse forces which had been predicted by the greatest of all living scientists, Lord Kelvin, as far back as his Baltimore Lectures fifteen years ago. Anyone acquainted in the least degree with physical science could not fail to foresee the enormous activity which would follow such an announcement, and the mere fact that Röntgen was able to photograph some bones of the body, to be followed by greater attainments in this direction by others, was as nothing compared with the enormous stimulus which physical science was given in many hitherto unknown directions. Results have followed with unexpected rapidity, as witness the investigations of Crookes, Becquerel, Russell, and others, who have shown us that many hitherto unexpected substances are constantly giving off radiations or stimuli which might be placed somewhere between the ultra-violet rays and the X rays. In a word, the attitude of physicists just now is to describe the universe as one in motion. Here it may not be out of place to submit some classification of the different forces which we now look upon as transverse waves in ether. If we do not expect the analogy to be too complete, we might compare, as is so frequently done, the different waves to those of sound, or as they are suggested to us by the keys of the piano. Passing from the left or lower notes to the extreme right or higher vibrations, we would place our electric waves, then the heat waves, next our red, green, violet and ultra light, then radio-active substances, and, lastly, X rays—assuming for the moment that they

are really transverse waves in ether. To what extent have we benefited in the study of medicine and surgery by these? Tesla's work has been applied by Arsonval in his highest frequency currents; radiant heat has not only of late been applied in its old and well-known methods, but dry heat has been administered at a temperature never dreamt of in past times; light, familiar at all times in its beneficial action in disease, has been studied and most successfully applied by Finsen. Thanks to the work of Becquerel, Crookes, and others, radio-active substances, such as radium, have been tried in skin affections, and I need not point out here that X-rays have also been applied with a considerable amount of success in affections of the skin, while experiments have likewise been tried in the deeper tissues of the body.

My own attention was drawn to these subjects in connection with the Glasgow Royal Infirmary Electrical Department, and, although not engaged in the general work, it was impossible to observe what was being done without thinking of the possibility of these forces being applied in our special department.

Before proceeding further, I should like to say a word in connection with that group of waves which are placed between the ultra-violet and the X rays. A reference to Russell's work has shown us that many of the substances hitherto considered inert are giving off active radiations, and it is impossible to think of these without asking one's self, "How do any of our drugs or agencies act in medicine?" No doubt some of them may do so mechanically or chemically, but is it not possible that many of them are giving off stimuli which excite the terminal nerves? After all, everything we speak of and appreciate by means of our senses is some movement.

I should like, in this connection, to hear the views of our former President, Dr. Stoker, whose work in the application of oxygen has more than once been brought before the Association. Of this we may be sure, that we shall never place medical science on a sure foundation, nor can we ever hope to make it an exact science, until we know something more in this direction. A few years ago light waves were not much associated in men's minds with electrical waves, but Clerk-Maxwell, Hertz, and others, have demonstrated the connection in physical science. May we not hope that some day the same may be done with different forces or agents employed in medicine?

Coming now to those affections with which we are familiar in our own special department, my thoughts were first attracted to the study of lupus, tubercle, and other chronic conditions, possibly malignant disease. Encouraged by the success of different methods

in the hands of others, notably in skin affections, and having had an opportunity of seeing the work done in the general hospital, the question of the selection of an agent was the first consideration. It was difficult to see how we could apply the X rays from the Crookes tube, seeing there is no means of reflecting or refracting them. I did, however, make many experiments on the superficial parts with considerable success. It was equally difficult when we tried to apply any of the radiating salts within the cavities, and the same may be said of Finsen's apparatus, although that has been considerably improved and simplified in the hands of Dr. Sequira. Arsonval's modification of Tesla's high frequency apparatus promises much, and I have by no means exhausted my experiments in this direction. One great difficulty in its present form is the liability to sparking which occurs from the electrodes when placed in the cavities, and which cannot be borne by the sensitive mucous membranes. Many modifications of Oudin's resonator were made, and I think it yet possible that something may be done to modify these results. In consequence of careful study, however, I was induced to fall back on other means, of which I shall speak later. The subject was approached, however, in the following way: The first thing which attracted my attention to the possibilities of therapeutic action was a dermatitis of my own hand, which occurred early in 1896. For reasons which need not be mentioned here, I was studying the effects of the rays on the fluorescent screen, and had placed a Bunsen burner below the tube. I was trying to verify the statements of J. J. Thomson as to the fact that there were different kinds of X rays. At the end of a few nights' experiments my hand became affected to such an extent that it was impossible to proceed with the experiments. It is to be noted here that the conditions in the tube were just such as we now recognise to be the best possible for producing such a dermatitis. The tube was soft, blue in colour, with a bluish-white stream passing down the centre of it. The hand was placed within a few inches of the bulb. There was no protection to the skin, and the experiments were repeated very frequently. I may here say that one beneficial result of these experiments was that it enabled me to avoid reaction in working generally with the X rays ever since. I next went to the other extreme, and worked for a long period with hard tubes; and, thanks to Lord Blytheswood, who presented me with an excellent device of his own for exhausting Crookes tubes, I was able to make many experiments during the next two years in every possible condition of vacuum. My first observations were recorded in the *Lancet* at the date mentioned five years ago. There I stated that, at the time the dermatitis occurred,

there were at least three possible agencies at work : Firstly, X rays; secondly, heat waves; and, thirdly, electric discharges round the tube. I found, as the result of experiment, that the heat waves could practically be discarded, and I am not now going to enter into controversy as to whether the X rays produce the dermatitis or not. For our work, however, we could not risk them in the region of the larynx. It seemed, therefore, that the electric discharges were worth while considering, and to these I directed special attention. The next fact which arrested my attention was one which occurred over two years ago, when I tried the effect of the electric discharges themselves upon a patient suffering from rodent ulcer in the nose and face. The patient had been operated upon three times before. I placed him in front of the X ray tube, but arranged the current from the coil in such a way that one could not detect any X rays, by means of the fluorescent screen; the X rays were, in fact, practically absent. The patient was treated daily for three weeks, and at the end of that time the rodent ulcer had healed. He was afterwards watched for a period, and instructed to return should there be a reoccurrence, but the part remained in a satisfactory condition. While the patient was being treated, if one drew the finger along his skin, a brush discharge could be felt distinctly; and, in fact, the patient was being charged much the same as if he had been placed in front of the old and well-known static machine. Being in possession of a large Wimshurst, I began experimenting; but, unfortunately, owing to a break-down in the apparatus, my work was suspended for some months. It was quite clear to me, however, that the subject was one well worth investigation, because it suggested to a certain extent—but only to a certain extent—the lines upon which Arsonval had been working so successfully. It differed in the following advantages: A current of greater potential, if less frequency; less liability to sparking; the choice of the negative or positive poles, the former being less painful; and, lastly, absolute control of the strength of these currents. If you follow me so far, you will see that one can obtain these high potential currents, first, from the electric field round the tube; secondly, from a modification of Tesla's original apparatus, which I have made and tried; and, lastly, from the static machine. Moreover, by the modification of introducing a spark-gap (well described by Monell in 1893), greater force could be added at will, and by introducing a piece of spiral copper wire into the circuit with condensers it could be made to approximate to Arsonval's modification of Tesla. These methods I shall demonstrate by means of magic lantern slides.

Turning, then, to the method of applying this force, let me say

that I have followed the old and well-established rules of workers with static machines. The patient is seated on a chair placed on a table insulated by glass legs. Contact is made with the table by means of a metal conductor from the negative pole, and a wire from the positive terminal is led to the electrode. For our work I prefer a polished metal ball, and this may be placed at a distance from the patient, or introduced into a cavity. Some of these points or electrodes I have brought with me.

Let me for a moment show you on the screen a photograph of the ordinary electric discharge, or, in other words, the sparks between the terminals of the Wimshurst. This is familiar to you all. Next, let me show you one representing the bluish lines of force passing from the positive electrode, which are quite visible to the eye, or what takes place in air under the conditions I have above described. This bluish, brush-like discharge suggests a force of great potential dashing towards the patient. It is accompanied by a hissing sound, and if there be no sparking it is painless, although the patient feels stimulated as if a cool breeze were playing upon the part. The adjustments of the electrode must be made carefully to prevent sparking, but the speed of the machine easily modifies the force. The sittings last from ten to twenty minutes, and are given daily. The mouth or nose can be kept open by glass tubes.

We might pause for a moment to consider what affects the patient. The electric currents themselves are invisible, but still the patient is also receiving a tremendous number of stimuli from this bluish stream, the result of contact with the air. We have it on the authority of Tesla that, with his apparatus at least, when a person is so electrified, he is bombarded with millions of particles of air, which, as they give up their charges of electricity, are setting up innumerable oscillations in the patient's tissues. In the hope of distinguishing between these two agents, I am showing you a parabolic reflector placed behind a series of brass balls, which can be stimulated to give off electric vibrations much the same way as in a wireless telegraphic transmitter. This mirror will send out no brush discharge, but electric oscillations; and should it prove effectual, it will help us to differentiate between the therapeutic actions of electric oscillations and other discharges, and it will also have this further advantage that, if successful, it could be made large enough to stimulate a number of patients at the same time.

Clinically, it may be of some interest to record the general facts to be observed during treatment. The patient experiences nothing beyond an exhilarating general effect; no pain is felt unless a spark

should pass to the patient, and even then it is not serious. The dust of the room rapidly collects on the surface of the patient's body, being attracted by the electric currents. Healing as a rule progresses steadily; granulations form in the parts until they have reached the proper level, after which epithelial structures cover in the parts. It is further interesting to note that discharges rapidly dry, and that the effect is not limited to the part in front of the electrode, because in some instances I have found that while one side of the face which alone had been stimulated was healing, other diseased structures on the other side at a distance took on the same action. There is no scar left. I have never seen the slightest attempt at reaction or dermatitis, which often accompanies X-rays, Finsen's, and in one case with me at least, high frequency currents. I have had the best results where no surgical operation had previously been performed; in fact, in any case where a scar has resulted or loss of tissue it has been where other measures had at first been tried. No medicine in the test cases was administered, and no other kind of treatment was applied to the patient.

I have thought of trying these high potential currents in the deeper tissues; in other words, it is a fair question to ask, Would not the tissues of the larynx or the lungs be affected indirectly? So far my best results have been got by applying the current in the way I have indicated, but I am at present engaged in a series of experiments to test the internal as well as the external benefits. As yet I have not been able to come to a definite conclusion in the matter.

RESULTS.

Lupus.—It is difficult to convey to you a fair and accurate idea of the changes which take place in the tissues of the nasal, pharyngeal, and other cavities under the influence of these currents, for the simple reason that they can only be seen by examination of the patients. I can show you some photographs, however, of the changes which take place in the skin of the face, because this was involved in many of the cases, the disease having spread by continuity of surface.

In this first photograph, that of a girl aged seven who had suffered for over three years from the disease, and who had been treated by means of the cautery and other methods, you will see the effect on the face, although the affection had also involved the nostrils as far back as the naso-pharynx. As recently as July the parts had been curetted for the third time under an anæsthetic, and in August seemed as unsatisfactory as ever. There was great

destruction of tissue and abundant discharge of a muco-purulent character, and on each side of the nostrils there was a diseased area of about one and a half inches, while the upper lip was seriously involved. Within three weeks the parts affected externally were quite dry, and the patient could go about without a dressing of the surface. In two months time the inside of the nostril had also healed, and the only part of the face in which there is a scar left is where destruction of tissue had taken place as a result of surgical procedure.

The second photograph which I show you is one of an interesting case of lupus occurring in a young lady, otherwise thoroughly healthy, aged twenty-eight years. She had at different times during the past ten years been under my care for lupus of the pharynx and naso-pharynx, and these were slowly, but successfully enough, treated at each attack by the ordinary methods. About a year ago the disease broke out in the face with great rapidity, and in a short time showed a bilateral, butterfly-shaped, diseased area, extending from the eyes downwards, and outwards on the cheeks for nearly an inch and a half on each side of the middle line. The skin of the nose, the upper lip, and the inside of both nostrils were seriously involved. The attack was accompanied by all the usual ulceration and offensive discharges. She was not under my care for this lesion, but her medical attendant, knowing the results of the X rays, sent her to me. We were not then so confident of the results as now, although, at her own suggestion, we began treatment with the X rays. Owing to the rapid destruction of the side of the nostril, it was thought advisable by her physician to stop treatment, and to apply more direct and radical measures, in the hope that the nose might be saved. The patient was put under chloroform, the worst parts gouged out, the rest of the diseased structure curetted, and the cautery was applied with no sparing hand. The patient was kept in bed for some time, and, beyond a pretty severe hæmorrhage or two, she made a good recovery. The disease, however, was not arrested. She was after two months put to bed, injections of tuberculin were given, until the great rise of temperature and other changes became so serious that those in charge of the case were afraid that the lungs would go wrong. This method of treatment also failed. Learning of Finsen's method, after consultation with her medical adviser she was sent to London. Here I should like to record the statement that the only reason why she was not subjected to the light treatment in this city was simply her own objections; it was offered to her, and refused by her and her friends. She decided on her return to try the X rays or other

treatment, and in three and a half months, first using the coil and tube in the way indicated, and afterwards and more effectually the static machine, the parts were quite healed, and this remark applies to the inside of the nose as well as to the face. Four months have elapsed since, and there is no recurrence of the disease. The patient is now perfectly healthy, and over the greater parts of the surface the renewed skin cannot be distinguished from the normal surrounding parts.

The third photograph which I will show you is that of a still more serious case. A lady, aged fifty-eight, was sent to me on account of lupus of the mouth, nose, and face. You will see from the photograph that the whole face, from the eyes out to the ears, and the nose, mouth, and chin are one mass of diseased structure, dark-red in colour and covered with crusts. There is great induration, and the lower third of the nose has been destroyed. The disease extends into both nasal cavities and the inside of the lips, which are swollen to three times their natural size; the gums, floor of the mouth, sides of the tongue, and the anterior third of the palate are all affected. The patient was very ill, unable to swallow with comfort, and she had suffered for twenty-one years. With two months' treatment the nostrils inside have two-thirds healed; the disease in the mouth is vastly improved; half of the diseased structure has gone; she eats and swallows with perfect comfort; and you will notice the changes which are to be seen in some of the other photographs which I now show you of the face. You will see areas of the disease being encroached upon by healthy skin, the swelling in the face has gone down, the cheeks are becoming pale in colour, the crusts and discharges are disappearing, and the patient has steadily improved.

The fourth photograph which I show you is that of a case which, I think, should be termed "lupoid" disease of the nose, because it occurred in a child of six who had suffered for three years, and who shows evidence of hereditary specific mischief. The septum in this case has gone, and the whole inside of the nose is involved. He had thrice been operated upon, and had been given internal remedies as well; but on my return from holiday last July, three weeks after the last surgical operation, the case seemed as bad as ever. The discharges from the nostrils were very offensive, and there was every evidence of the disease spreading rapidly. Within three weeks of the new treatment the discharge began to dry up, and in two months the parts had practically healed. He is now under treatment for the specific affection elsewhere, and the condition of improvement is being maintained. In this particular case I must record the fact

that he is having iodide of potash internally since my treatment ceased. In the other cases above mentioned no other treatment whatever was given.

I could quote other cases of lupus, but the results will probably be brought before some other meeting of the Association, and sufficient has been said to show that electric currents of high potential seem to affect such diseased structures beneficially.

Tubercle.—I prefer meantime not to give any definite statements with regard to the action of this agent in the ordinary tuberculous affections of the upper respiratory tract which are of interest to us. The commoner seat of the infection, the region of the larynx, presented great difficulty at first, owing to a tendency to spark when electrodes were introduced into the cavities. This difficulty, to a great extent, has been overcome, and it was the one which I have already said offered the greatest problem in trying Arsonval's apparatus. I have cases under treatment at present, and can say in a case of tuberculous ulceration of the epiglottis the results were quite satisfactory. A second case of a rapidly increasing tumour of the nasal septum on the right side, which caused great stenosis and clinically suggested a sarcoma, and was diagnosed microscopically by the pathologists as tuberculous, has been vastly improved. The tumour, which was about 1 inch in diameter and pressed against the outside wall of the right nostril, is now practically on a level with the septum, and a very small area requires to be covered in. The stenosis is altogether removed, and the patient is free of pain and discomfort.

Epithelioma—Rodent Ulcer.—I have already indicated in my paper that this affection seems to yield to the same method of treatment, and one case referred to above has remained well for two years after other methods of treatment had failed. On the screen I now show a photograph of another case on the cheek. This patient, aged fifty-five years, dates his illness back to an attack of erysipelas about twelve years ago, and five years ago the condition was diagnosed as rodent ulcer; he had been treated in various ways previously. You will notice the difference from the time I first saw him, three weeks ago, and now. The wound is granulating, a bridge of skin has formed across the centre, and comparatively little now remains to be covered in.

Coming to the most serious forms of epithelioma, I must speak with the utmost reserve, being fully impressed with the responsibility of saying anything which will mislead you about the results. My whole work is in a purely experimental state, and would not be referred to were it not that a number of surgeons and patients

know that the experiments have been tried in this direction. Perhaps, although I should prefer it otherwise, it is as well, therefore, that a clear statement should be made. From what I have seen, these currents (and I might say the same of the X rays) seem to have some effect in stimulating the normal healing forces. I need hardly point out to you that in the present state of knowledge no surgeon would feel justified in setting aside operative procedure where it is feasible, and consequently only the most advanced and inoperable cases have been placed at my disposal for observation and experiment. I have had one good result, and now have two advanced cases under observation—one where the disease is in the region of the fauces and the other in the œsophagus and larynx. The disease in the former, after two months' treatment, is apparently arrested. The difficulty of opening the mouth, pain darting to the ears, dysphagia, and similar symptoms, have all improved, and the patient's weight has been maintained for three months; the growth itself is smaller. In the other similar changes are taking place. I will not say more than that the disease seems to be arrested, but the cases which I have under observation are showing results sufficient to justify the continuation of the treatment. Both instances are inoperable in the opinion of competent surgeons.

In placing the above-mentioned experiments before you I have not ventured to draw a comparison between the methods suggested and others. In all there are advantages and disadvantages. That certain results have been obtained there can be no doubt, but the question arises, Will they be permanent? At present sufficient time has not elapsed to speak definitely, although even now a longer time has passed in some of the cases during which the patients have remained well than after any other method of treatment tried in them.

Another important question naturally suggests itself, and I have been more than once asked, "How do these high potential currents act?" Here again we have to answer that we do not know. It may be, although it is hard to see how it can possibly be, that there is a mechanical stimulation, and one can imagine that there may possibly be chemical changes, although this does not look so likely in view of what I have said—that parts often take on healing actions which are at a distance from that directly stimulated. We have it on the authority of Tesla, as we have said, that the whole body of the patient at the time of stimulation is having an infinite number of oscillations set up within it. That the action may be germicidal, of course, has been often suggested, and the same

view has been taken of the action of X rays. I need hardly point out to you that this statement has not been proved, and no one has contributed more to our knowledge in this department than our distinguished colleague, Dr. R. Norris Wolfenden. His views, as the result of most careful research, point in the direction of greater activity rather than destruction as a result of stimulation with the X rays. I am aware that it has been suggested that while at first the germs are increased rapidly, after a number of generations, owing to their rapid reproduction, they lose their virulence. To all these speculative questions there can be but one answer meantime, and that is that we do not quite know. What is not at all unlikely, however, is that in some way or other the natural forces at work in the tissues to cast out disease are stimulated to greater activity.

No one can approach this subject with much greater doubt than I did. My sincere desire is to place a plain statement of facts before you such as they have presented themselves to me up till this time, and in the hope that perhaps others may see their way to try the same methods. That many of these so-called physical forces can stimulate, and have stimulated, the normal tissues to cast out diseases no one can doubt, even if we are not yet sure of permanent result. Last night I had the privilege of hearing Mr. Herbert Jackson give his Presidential Address to the Röntgen Society, and he pointed out that if several agents produced like results in certain diseases, there must be a common agency at work. In our first investigations, therefore, it is of importance that we should find all these forces, try them, and afterwards compare results. It is because I have found by a process of selection that high potential currents may be useful in the treatment of affections of the upper respiratory tract that I venture to offer this slight contribution to the general question.

In connection with this paper I desire to acknowledge with my sincerest thanks the able and valuable assistance rendered me in carrying out experimental details by Mr. Alexander Chaplin and Mr. Walter Jamieson, A.M.I.E.









