

ELECTRICITY IN GYNÆCOLOGY

BY

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P R E F A C E

As this work is intended to be a practical guide to the use of electricity in gynæcology, only those methods of electrical treatment which have been proved to be of real service are included. While it is presumed that the reader possesses some knowledge of this force, every effort has been made to avoid confusing technicalities, and to make as plain as possible the actual details of the applications. Almost all the suggestions given have been selected from the Author's practical trial and experience of many methods, as the simplest and productive of the best results.

This manual is particularly directed to the general practitioner, and the apparatus required for the successful application of electricity in gynæcology is neither so complicated nor so expensive as to preclude its use by him, while the results he would obtain by its use in suitable cases would amply compensate him for the trouble he might take to acquire the necessary manipulative skill.

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ELECTRICITY IN GYNÆCOLOGY

INTRODUCTION.

THE treatment of morbid conditions of the human organism by various electrical applications is of considerable antiquity. It would be tedious, and very unnecessary here, to detail the history of the use of this force as a curative agent, for such a history, however interesting, has but little bearing upon that practical side of the subject with which this book is chiefly concerned.

Many things have combined to discredit electrical methods of treatment and to prevent the general recognition of this power as an indispensable adjunct to rational therapeutics.

The mysterious character of the force, and the comparative ignorance of the public as to its capabilities, have opened a great field for charlatanism: from the vendor of 'electric' belts to the hairdresser's assistant, who administers the so-called 'electric' massage,

quacks have found in the term 'electric' a valuable aid to their efforts in gulling the public.

This state of things, naturally, has done much to prejudice both the medical and lay minds against electrical methods of treatment, and when combined with this we have a singular scarcity of literature dealing with the *practical* methods of using the power therapeutically, and the intimate knowledge of details necessary for its successful manipulation, it is not to be wondered at that so little progress has been made in electro-therapeutics.

It has been truly said that while surgery has advanced to the rank of a science, medicine has remained an art. In spite of modern researches, our knowledge of drugs and their actions remains in a very imperfect condition; and the bulk of our books on the art of medicine are filled up with intimate descriptions of pathological conditions, while but a very small portion is devoted to the treatment of these conditions. We find the most learned authorities differing upon the essential points of treatment of almost every disease, and we are constantly meeting with reliable accounts of the successful treatment of the same abnormal state by diametrically opposed forms. What does all this mean? Does it not seem to indicate that other factors besides the actual presence of the disease, or even the peculiarities of the patient's 'constitution,' must be taken into account if we are to hope for anything like uniform

results? And if we search for these, the very multiplicity of the surrounding causes, which may, and certainly do, influence the action of any drug or method of treatment, is bewildering in its greatness. Meteorological changes, with the variations of temperature, of atmospheric pressure, of terrestrial electricity and magnetism, the physical influences of the larger planetary bodies and their varying positions in relation to this globe, the action of the tides, the aerial electrical disturbances, with the corresponding variation in the quantity of ozone in the air, the presence of light in a constantly varying intensity—these and a host of others go to make up the reasons of the uncertain results of treatment of the human body.

This uncertainty is due mainly to the uncertainty as regards dosage; for the effects of any particular dose must vary according to so many influences, that even if we were in a position to appreciate these influences at their full value, we should be compelled to readjust the dose several times daily in order to produce a scientific uniformity of effect.

To this must be added the cumulative tendency of many of the most important drugs—a tendency which must nullify our efforts towards a steady persistence of any particular effect. Such reasons as these would make us naturally choose for a therapeutic agent one whose action we could regulate more certainly and persistently, if we could find such a one.

To a great extent this is true of electricity, and as the knowledge of this force as a curative power becomes more extended, I have little doubt we shall find it more and more capable of regulation and direction. I do not see the least likelihood of electricity entirely replacing the therapeutic measures of the present day. I *do* believe that in the treatment of those chronic diseases which have proved so unamenable to drug treatment we may hope for better and more certain results by the correct use of the physical forces.

If we look upon disease as a failing function resulting in an abnormal nutrition or denutrition of certain cells, the natural definition of a true remedy would be something which by renewing this failing function would bring about a renewal or replacement of the defective cells, as the natural tendency of organized tissue is to return to its normal shape and condition. Electricity answers to this definition; in the words of Tripier, it is the one 'agent which allows us to influence at will those grand aspects of life, nutrition and function.'

Physiological researches seem to point to the conclusion that the main duty of nerves is the convection of electric currents, and though absolute proof of this has not yet been obtained, there is a considerable amount of evidence in favour of the supposition that every cell of the countless numbers which go to make up the human body is connected with the central nervous system by a nerve filament; that it is, in

fact, a complete galvanic cell itself (Becquerel), sending a current of nerve or electric force for storage to the brain, to be eventually expended in function or movement. If this is admitted, and it is a hard thing to combat the theory, it is to the blood we should look to recharge these galvanic couplets, and to act more or less as the exciting fluid. There is a further important source of electricity in the body: namely, the passage of the red blood corpuscles through the capillaries causes them constantly to be brought in contact with closed circuits. Now, they are themselves, on account of the iron they contain, magnetic bodies of high and constantly varying intensity, and the result of their contact or approximation to closed circuits is the excitation of induced currents in these circuits.

In fact, the whole subject of electro-physiology is an exceedingly complex one, and offers a most promising field for research.

The experiments of Tesla and D'Arsonval on the effects of alternating currents of high intensity and frequency are most important from an electro-therapeutic point of view, but the results of their experiments are at present too nebulous and insufficiently worked out to justify their inclusion in the *Electro Materia Medica*. One fact has, however, been ascertained which has a very important bearing on the subject of vital metabolism. It has been demonstrated by observers of whose accuracy and good faith there could be no possible question, that if the body be

enclosed in a helix of insulated wire, through which alternating currents of high frequency and great intensity are passed, the whole of the vital processes of the organism are enormously stimulated by the powerful induced currents set up in the body. No sensation of pain or the passing of a current is felt, yet the temperature of the body is raised, the amount of carbonic acid excreted is nearly doubled, the heart is steadied and its beat strengthened, the quantity of urine passed is about a third greater, and the whole nutrition is improved. Such striking facts surely go far to show what a large and important part is played by the direct and induced currents of the body in enabling each organ to perform its proper functions.

Valuable as the faradic coil is, I have no hesitation in saying that the invention of this piece of apparatus did much to retard progress in electro-therapeutics. It was looked upon as a substitute for the static machines which were previously used, and its use as such was based upon an erroneous conception of its action. If not absolutely hurtful to the patient in some cases, it was at best not productive of that beneficial effect which would have followed the choice of a correct application of the force.

The popularity and comparative simplicity of the faradic and electro-magnetic machines, and the powerful muscular and sensory effects they produced, led to them being so widely used that even now the sugges-

tion of electric treatment usually conveys to the patient the idea of shocks from a faradic machine.

The main source of benefit in the use of static electricity is believed to be the combination of a very high tension with a very small quantity. In the ordinary static machine the current can be made to flow in one direction only; in the coil, on the contrary, the secondary current is an alternating one, and the tension, even in the largest medical coil, is infinitely lower, while the quantity of electricity passing is much greater than in the case of the static machine.

CHAPTER I.

APPARATUS.

THE choice of instruments for the electrical treatment of women is of the greatest importance, and deserves most careful thought. A great deal of the unpopularity of this method of treatment with many gynæcologists is due to the choice, in the first place, of apparatus unsuited in size and character to the work which it is called upon to do. It must be always remembered that only a certain amount of energy can be derived from a battery, and that this is necessarily proportionate to its size.

On account of the considerable amount of resistance to the passage of the current which the human body presents, a relatively high tension or voltage is necessary when it is attempted to pass currents up to 500 milliampères. This tension can, of course, be readily obtained by joining up a number of the chosen cells in series, *i.e.*, connecting the carbon of one to the zinc of the next one, and so on, the electrodes being

attached to the carbon of the first and the zinc of the last in the series; and on account of the small amount of current which is used in medical work, never exceeding 500 milliamperes, or half an ampère, it is possible to use very small cells, and so have the battery in a very portable form; yet it must never be forgotten that cells of this size cannot be expected to furnish considerable currents for any length of time. Such small and portable batteries are extremely convenient when it is absolutely necessary to carry out the treatment in the patient's house, but where it is intended to make constant and prolonged

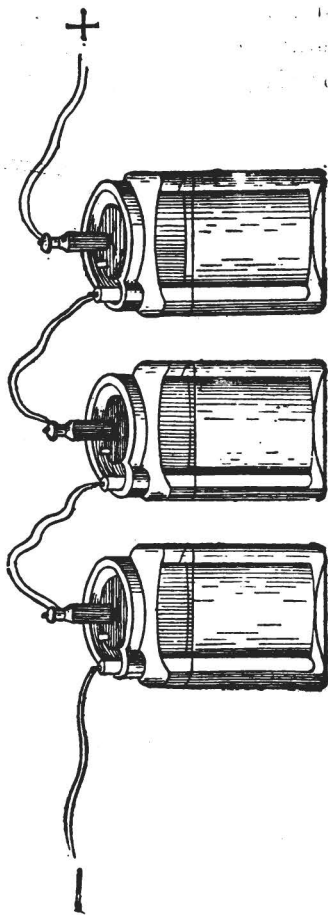


FIG. 1.—THREE CELLS IN SERIES.

use of the instrument such small-sized cells are unsuitable, and are apt to be a constant source of trouble and annoyance to their owner. For these it is necessary either to use large-sized cells, of at least quart size, or else, where it is possible to do so, take the

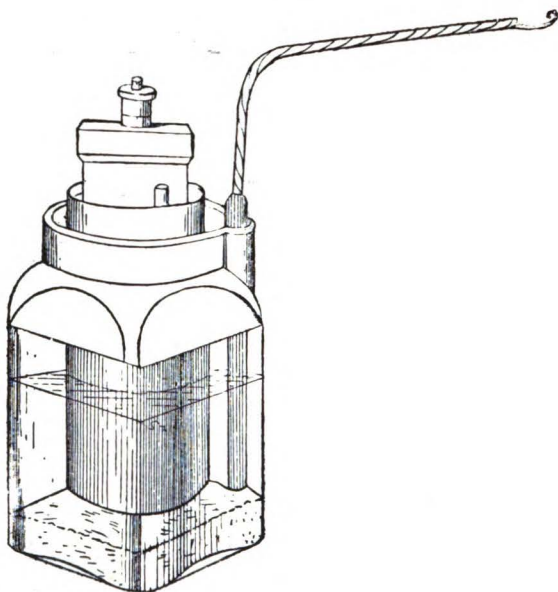


FIG. 2.—A LECLANCHÉ CELL.

current from the street main by means of suitable apparatus.

The Leclanché is by far the most suitable cell to use. A very good type of this cell is made by Mr. K. Schall, of Wigmore Street.

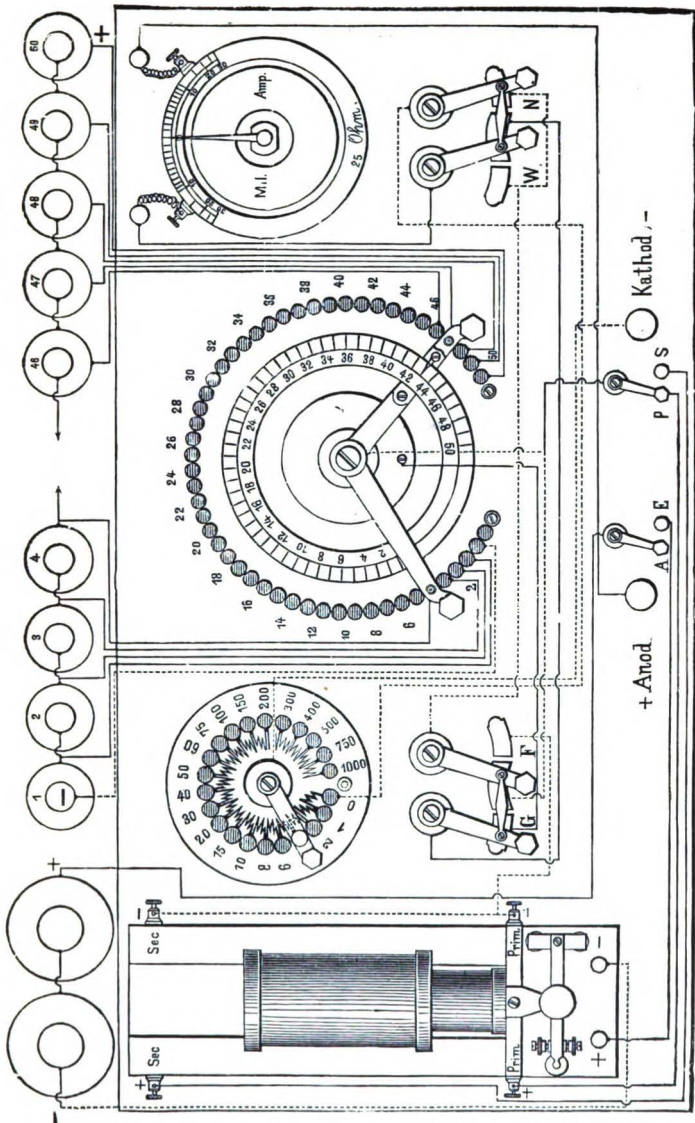


FIG. 3.—DIAGRAM OF THE CONNECTIONS OF A CABINET BATTERY.

Whatever form of battery, whether large or small, is used, at least thirty-five cells, joined in series, will be necessary. This cell is excited by a solution of sal ammoniac, and it is important that the salt should be as pure as possible, as the ordinary commercial salt sold for the purpose does not give nearly as good results. The jars should be half filled with a saturated solution, and then a little water added, to prevent



FIG. 4.—GRAPHITE RHEOSTAT, WITH MERCURY CONTACT.

Total resistance about 100,000 ohms, which can be diminished gradually, without any jumps, down to about 20 ohms, by turning the glass dial.

crystallization. The upper part of the outside of the jars should be painted with melted paraffin, to prevent creeping of the salts, and the glass jars should not stand so close together as to touch. If a rubber band is placed over the upper and lower ends of the porous pot, so as to prevent the zinc touching, it is a distinct advantage.

The cells should be filled at least twenty-four hours before they are to be used.

Each cell should, when tested, give an electromotive-



FIG. 5.—SIMPLE LIQUID RHEOSTAT.
(Suggested by Dr. Dawson Turner.)

force of nearly 1.5 volts, and have a resistance of about 0.5 ohm, and every four or five weeks the cell should be tested as to its voltage, and, if it shows a decrease, examined for the cause.

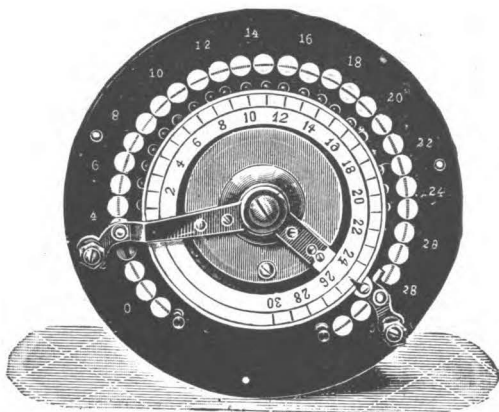


FIG. 6.—DOUBLE COLLECTOR.

In order that a battery should remain in order, it is necessary that it should be regularly used, and that the poles should never be connected, even momen-

tarily, unless a suitable resistance is interposed. It is better, though not absolutely necessary, to fill the cells with fresh solution once a year, emptying out the old solution and cleaning the cell thoroughly at the same time. When the zincs are much worn they

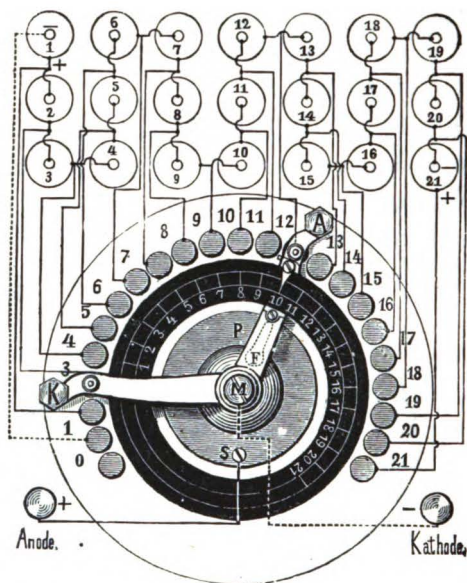


FIG. 7.—DIAGRAM OF CONNECTIONS OF DOUBLE COLLECTOR.

should be replaced by new ones, which can be had for a few pence.

In using such a battery as this there must be some way of drawing off any particular amount of current desired, and of gradually turning it on or off to avoid

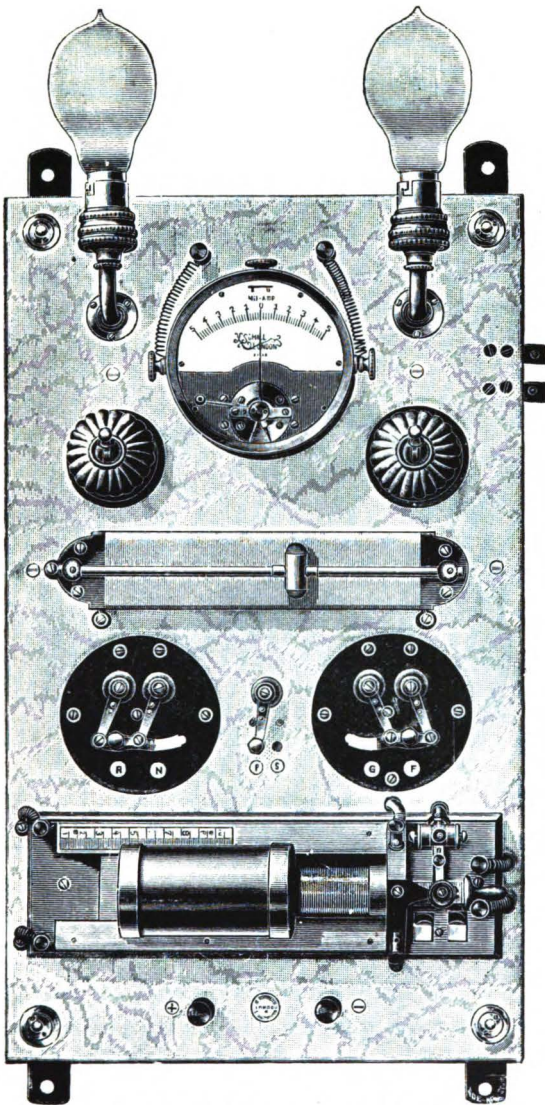


FIG. 8.—APPARATUS FOR UTILIZING THE CURRENT FROM THE STREET MAIN (SCHALL).

giving shocks to the patient. This can be effected by interposing a rheostat, or variable resistance in the circuit. Water rheostats are not much used in this country, but I have found them on the whole preferable to the carbon or wire resistances usually supplied. A very good form of water rheostat is the American invention known as the Bailey rheostat, and can be procured from Messrs. Waite and Bartlett, of New

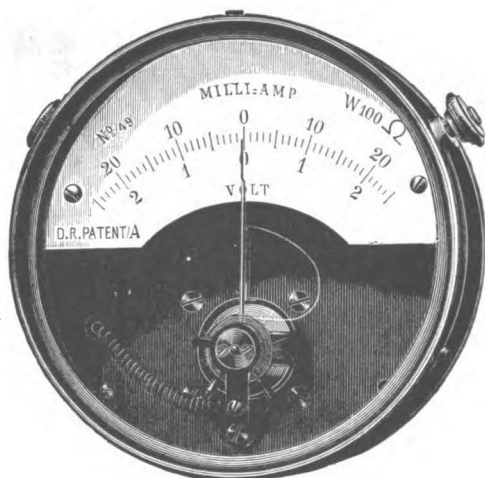


FIG. 9.—D'ARSONVAL'S GALVANOMETER.

York. Both the carbon and the wire resistances are very apt to give slight shocks in increasing or diminishing the current, and on this account are unpleasant to the patient.

It is certainly advisable to use some form of double

current collector, so that in any application the tension may not be more than is necessary to pass the required amount of current through the patient. It will be found that even when the same amount of current, as shown by the galvanometer, is passing, the application is more painful when a high-tension

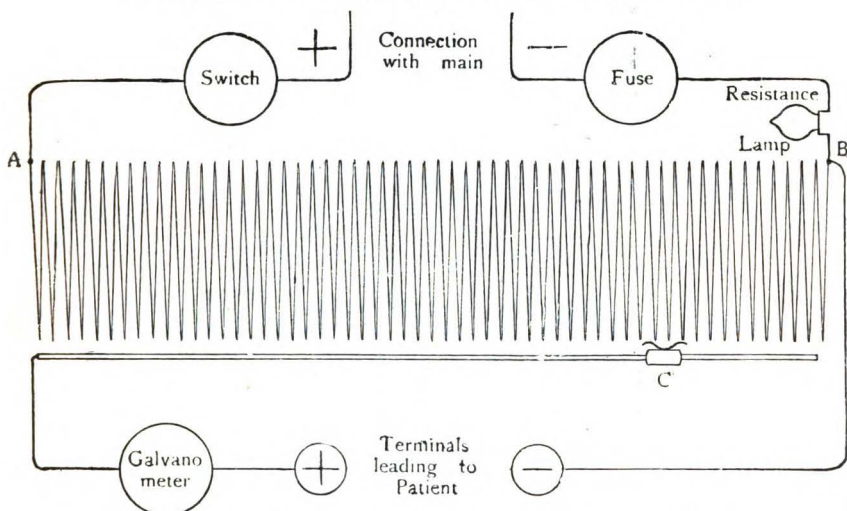


FIG. 10.—DIAGRAM OF CONNECTIONS IN APPARATUS FOR USING THE CONTINUOUS CURRENT FROM THE MAIN. THE PATIENT IS IN A SHUNT CIRCUIT.

current is used. The advantage of the double over the single collector is that it enables any particular cell, or group of cells, to be used so that all the cells of the battery can be given an equal amount of work.

A galvanometer to measure the exact amount of current passing is an absolute necessity. For regular

use I have found the D'Arsonval galvanometer, with shunts showing up to 50 and 500 milliampères, in every way satisfactory. It possesses the great advan-

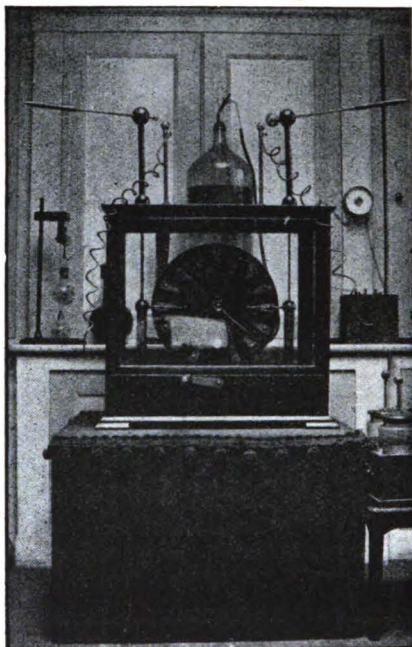


FIG. 11.—SMALL WIMSHURST MACHINE WITH INSULATED PILLARS FOR INTRODUCING A SPARK-GAP IN CIRCUIT.

tage of being independent of the earth's magnetism, and can be used in any position.

Whenever the current is employed, a rheostat and a galvanometer should be in the circuit.

Where it is convenient to make use of the current

from the street main, this is far preferable for most reasons to the use of batteries. It is only when the current is a continuous one that it can be employed instead of the battery for continuous-current work, and it is necessary that special resistances should be interposed. These usually take the form of lamps, and where the patient is in a shunt circuit, and the

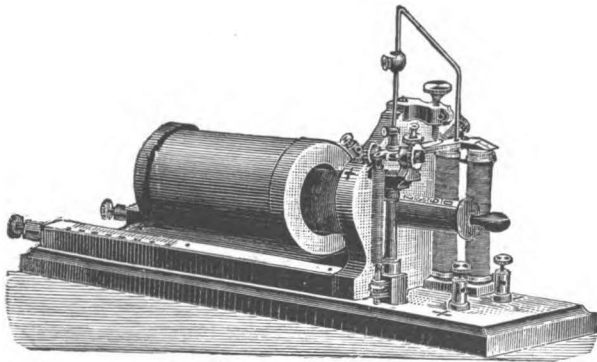


FIG. 12.—A DUBOIS-RAYMOND COIL.

apparatus is properly made, there can be no possibility of her receiving a dangerous current. Where, however, strong currents are being used, care should be taken to ascertain by inquiries at the office of the supply company that the current is not likely to be turned off without warning, as when currents of over 50 milliamperes are passing, especially in abdominal work, a sudden break in the circuit might be productive of dangerous results. A very good form of

apparatus is made by Mr. K. Schall, and it is one which I can strongly recommend. In this there is an arrangement for regulating the voltage according to the amount of current required, and thus quite getting over the unpleasant burning caused by the high pressure.

A sixteen- to fifty-candle-power lamp may be used as a resistance, the former being the most suitable

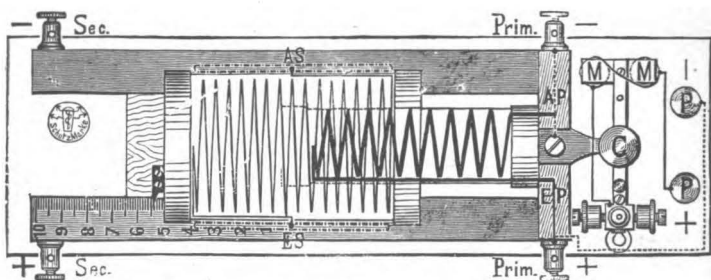


FIG. 13.—DIAGRAM OF INDUCTION COIL FROM ABOVE.

in the majority of cases, and permitting a more gradual regulation of the current passing.

Faradic Coils.—There are a large number of faradic coils, each differing in some detail of construction, in use. The kind, however, which is most suitable for therapeutic work is that known as the sledge coil. In this coil the secondary slides over the primary, so that the strength of the current can be varied with great smoothness, and secondaries wound with thick or thin wire can be used with the same coil. The contact-breaker is a very important part of the coil used in abdominal

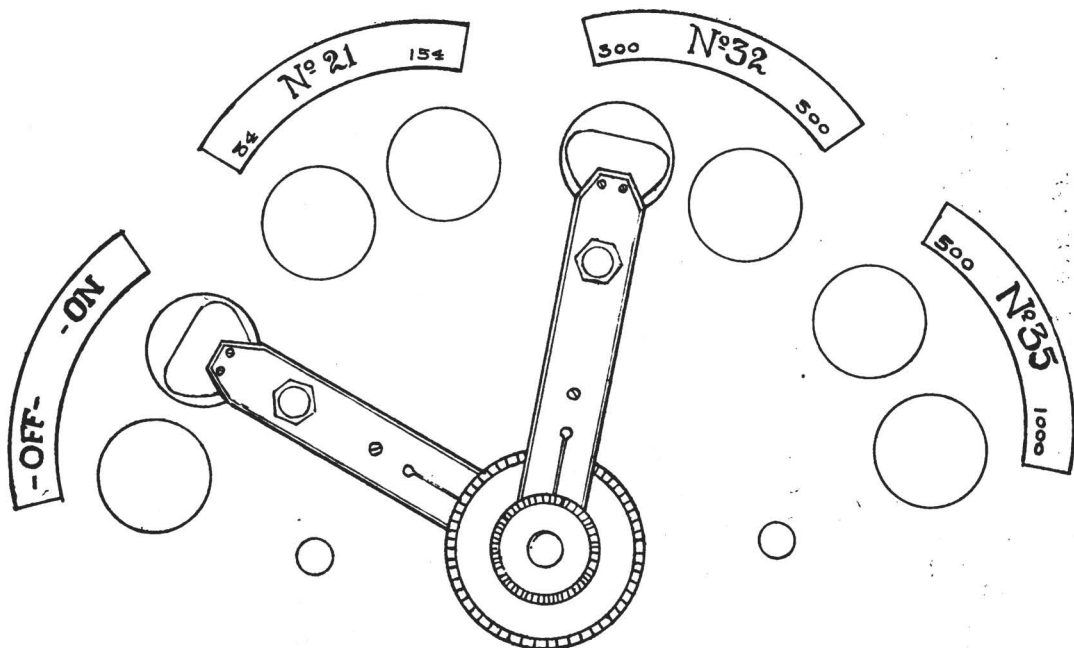


FIG. 14.—COMPOUND SWITCH, BY MEANS OF WHICH IT IS POSSIBLE TO TAKE THE CURRENT FROM ANY SECTION, OR COMBINATION OF SECTIONS, OF THE SECONDARY COIL.

work. It is necessary that there should be a means of regulating its speed from forty or fifty in the minute to thirty thousand, and that the interruptions should be quite regular. This can be readily accomplished by what is known as the Mier disc rheotome, or by a contact-breaker worked by clockwork or a small electromotor. A coil that is very largely used is that

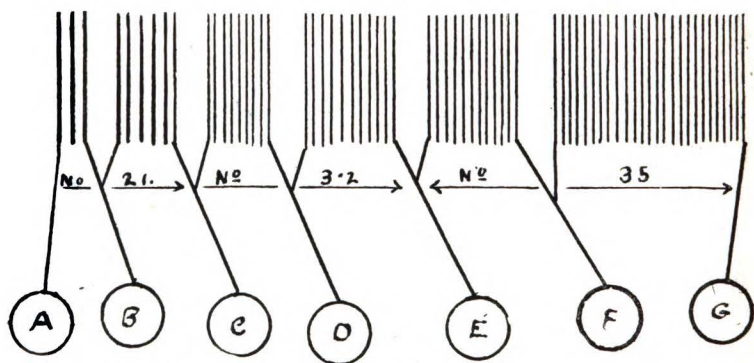


FIG. 15.—DIAGRAM OF WINDING AND CONNECTIONS OF SECONDARY COIL.

(The knobs A, B, C, D, E, F, G are for contact with the pointers of the compound switch.)

designed by Englemann, and there is no doubt that this apparatus is one that represents all that is most valuable in medical coils. The faradic apparatus which I have been in the habit of using is one which presents, I think, many advantages over those in ordinary use. It is made by Coxeter of London, and a somewhat similar one by the Kidder Manufacturing

Company of New York. The coil has a secondary composed of 7,614 feet, made up of three different thicknesses of wire, tapped at six different places. The first length of wire is No. 21 B.W.G., and is tapped at 84 and 154 yards; the second division is composed of No. 32 wire, tapped at 300 and 500 yards;

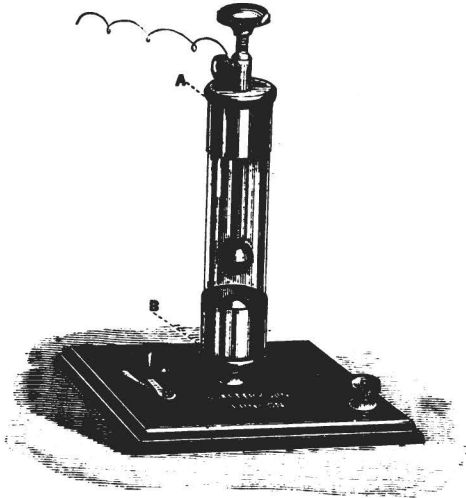


FIG. 16.—WATER RHEOSTAT.

and the third is of No. 36 wire, tapped at 500 and 1,000 yards. Thus, instead of having a number of secondaries to the coil, there is only one, so that the apparatus is much more compact, yet it is possible to get twenty-one combinations with these different wires. This is done by means of a compound switch (Fig. 14) placed at one end of the coil, so arranged that by

placing either or both of the pointers in contact with any of the metal knobs, the coils connected with these knobs, as shown by the numbers opposite, will be employed.

In this coil there is a very rapid interrupter and a slow one with the necessary switches for putting them in action, and, most important, a rheostat in the battery circuit, so that the amount of electric pressure acting on the primary coil can be modified. The secondary coil can be moved backwards and forwards over the primary. This particular coil can be worked with four large dry cells, but where it is much used it is better to employ large fluid cells. They are, of course, not so portable, but they do not polarize so quickly, and they admit of being easily recharged when they are exhausted. Such a coil can be worked from the street main if a lamp resistance be placed in the circuit.

The most suitable form of battery for working a coil is undoubtedly the dry cell (Fig. 17). In order that these should be fairly constant, they should be of a large size, and if care is taken to prevent short-circuiting, they will last very well according to the amount of work they are required to do, though in most instances, whether they are worked or not, they will become useless after a certain time, owing to the increase of the internal resistance.

The bichromate cell is not suitable for medical coil work; it is messy and very inconstant, the exciting

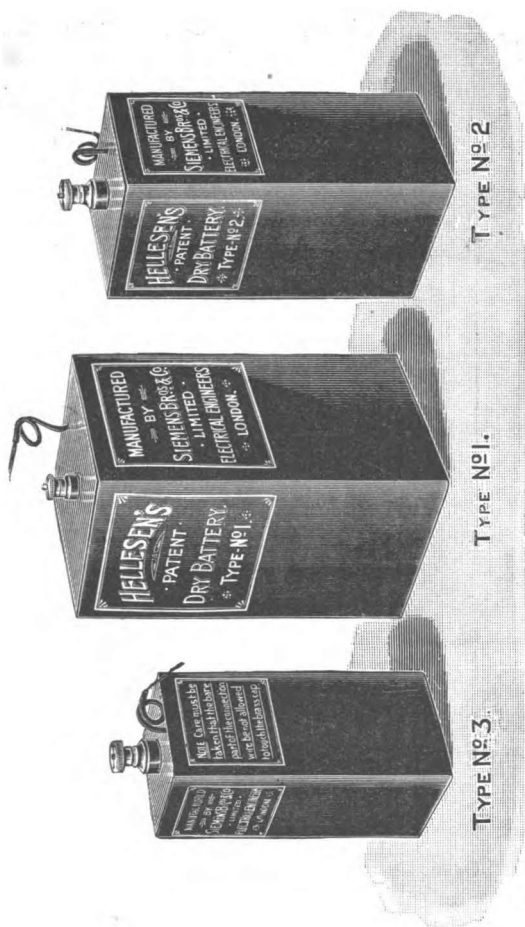


FIG. 17.—HELLESEN CELLS.

fluid is corrosive, and on this account the connections are a constant source of trouble and annoyance.

Electrodes.—Electrodes specially suited for external

use, for vaginal, uterine and rectal applications, will be required.

For external use the electrodes are best made of thin sheet tin or Britannia metal with suitable binding

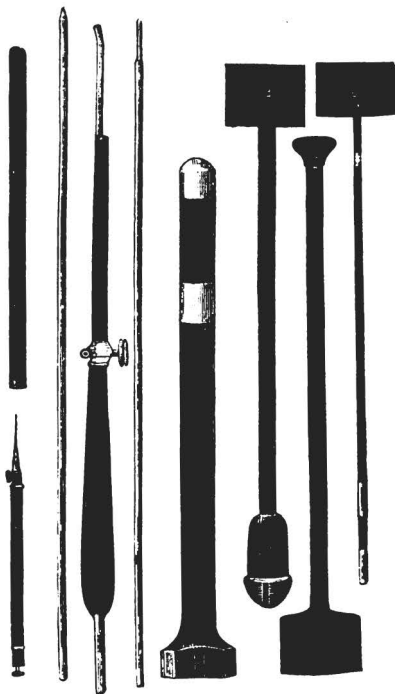


FIG. 18.—*APOSTOLI'S ELECTRODES.*

screws soldered on, and covered with lint or absorbent cotton-wool for use. These should be of various shapes and sizes, so as to suit the particular kind of application they are required for. It is well to have two of 8 by

4 inches, two of 4 by 3 inches, two of 3 by 1½ inches, and one of 10 by 8 inches. A specially flexible electrode will be needed for use in abdominal applications where very heavy currents are used. This may be of wire-gauze well covered with absorbent cotton-wool, or of crushed carbon in a flannel bag, and should be of a size large enough to completely cover the abdomen. Several of these will be required, and they must be cut and shaped to suit each case. The clay electrode originally recommended by Apostoli undoubtedly gives the best contact, but it is so unpleasant to both patient and operator that I cannot recommend it. If it is used, the form described by Goelet, where the back is of rubber cloth and the face of absorbent cotton-wool, is perhaps the most convenient to use. It is necessary to have some means of warming the clay before applying it. A substitute for this, and a very efficient one, is made by Coxeter of London. It consists of a gelatinous preparation spread on wire gauze, which, by adhering closely to the skin, gives very good contact. It becomes rough with use, but can readily be smoothed with a hot knife.

For applications to the endometrium, and generally for intra-uterine application, a sound with the intra-uterine portion of platinum, and having a movable sheath which can be fixed in any position on the instrument, is necessary. A screw in the handle is the means by which the conductor is fastened on to

it. Another sound having a carbon tip is useful for localizing the current where it is necessary to act on small portions of the endometrium at a time. A bipolar uterine electrode will also be required; this can be used for either galvanic or faradic applications.

For the treatment of stenosis, tin bougie electrodes of graduated sizes, made to screw on a common handle, are very convenient. Cup-shaped electrodes fixed on to flexible handles can be obtained, suitable for applying to the os uteri. For vaginal applications, a bipolar faradic electrode, as described by Apostoli, will be required. A metal cylinder and a ball are useful for vaginal galvanic applications, and a vulcanite one with a metal tip is necessary where it is desired to act only on one portion of the passage. Electrodes, both for rectum and vagina, which may be attached to a douche-can, so that the current is diffused by the fluid, are useful, and vulcanite taps, with connections suitable for administering the galvanic, faradic, or static douche, are constantly needed. Long needles, platinum-pointed or heavily gold-plated, well insulated to within a short distance of their point, are necessary for electro-puncture. These should be made to fit into a handle, so that connection with the battery may be made after they are inserted. They are made with a movable shield fitting over the insulation, so that the distance they are to be inserted can be marked before making the

puncture, preventing any chance of puncturing too deeply. These latter are the best to use, though they are a little difficult to render thoroughly aseptic.

CHAPTER II.

METHODS OF APPLICATION.

Intravaginal Applications.

IN intravaginal applications the indifferent electrode is placed on the abdomen or back. Size should vary with the strength of current used; about six inches square is a convenient size unless heavy currents are being used, when a larger electrode becomes necessary, because the larger the electrode the less the resistance to the passage of the current, and consequently the less the pain and burning of the skin. The electrode on the abdomen should be arranged so as not to rest on the iliac spines. Where for any reason it is considered advisable to still further diminish the resistance, an additional electrode on the back should be used.

The indifferent electrode may consist of a flat cake of sculptor's clay, mixed up with water and a little glycerine, and placed on a piece of muslin soaked in salt and water. A lead or block-tin plate should be placed on clay and pressed firmly into it, the metal to be connected with the battery. A double fold of thick

flannel or a layer of absorbent cotton-wool soaked in a strong saline solution makes a very good electrode. A similar metal plate would be laid on this and connected with the battery.

It should be remembered that the nearer the resistance of that portion of the electrode which is in contact with the skin approximates to the resistance of the skin, the less the burning and irritation at the point of contact, no matter what the current strength is. With all electrodes it is better to use cold saline

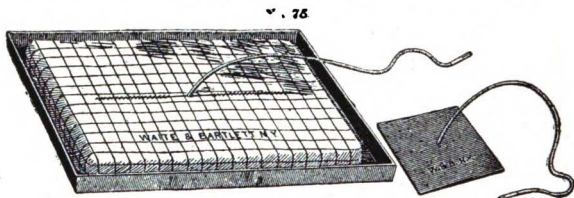


FIG. 19.—ELECTRODE OF SCULPTOR'S CLAY.

solution, but this applies more particularly to the clay one. All should be covered externally with a piece of mackintosh cloth when adjusted, and the patient should be directed to make steady and even pressure on this with both hands, to ensure good contact. The active pole in the vagina should consist of either platinum or carbon if constituting the positive pole, unless the specific action of the metallic salts formed at this pole when other metals are used is desired. Carbon or any metal may be used for the negative electrode. For general use the carbon electrodes of Dr. Apostoli have hardly been improved on.

Both electrodes should be in position before the current is turned on, and there should always be a milliampère metre and a suitable rheostat in the circuit. When first turned on, the galvanometer should not show more than 5 milliampères, and the current strength should be gradually increased by diminishing the resistance in the circuit. The intervals between sittings should generally be proportionate to the current strength used. When this exceeds 50 milliampères, two or three days should intervene, and when other strengths are used a proportionate interval. The duration of the sitting should generally be from five to fifteen minutes. If much pain is complained of externally, the electrode should be slightly moved; if there is any fold, it must be carefully smoothed out, and especial care must be taken that no lump or crystal of salt is in contact with the skin, as this is often a source of considerable pain, and if allowed to remain would produce an ulcer. While examining the electrode it should not be entirely removed from the skin, but the current strength should be diminished, afterwards increasing it to full strength. The abdomen should be sponged with warm salt-and-water solution, and all pimples or scratches covered with oil-silk before applying the electrode.

Intra-uterine Applications.

External or indifferent electrode the same as used in applications in the vagina. Details of application the same. The patient should take a warm douche of at least 2 quarts of a 1 in 40 carbolic solution before coming, and a suitable antiseptic douche must be given immediately before the introduction of the uterine electrode. This electrode should consist of a platinum-tipped sound or carbon stem, preferably the former, as it is smaller and more easily introduced. The electrode must be insulated by a piece of rubber tube or movable celluloid sheath, except at that portion which is intended to bring the current in contact with the tissues, a part that may vary, according to the effect desired, from a small tip to from 3 to 3½ inches. The smaller the surface in contact, the greater the local effects. By using sounds of different metals as the positive pole, the salts formed by the action of the chlorine liberated are driven into the tissues, and definite caustic and astringent effects may thus be produced, or the sound may be dressed with cotton-wool saturated with any liquid which it is desired to drive into the mucous and submucous layers.

Always apply the positive pole internally for the first two or three sittings, afterwards, if desirable, changing to the negative.

Always turn on the current very slowly, and never exceed a current strength of 40 milliampères for the first two applications.

The frequency of applications should be according to the strength of current employed; for instance, 20 to 30 milliampères for fifteen minutes daily for a week, and then an interval of three or four days, or stronger currents every three or four days for from five to ten minutes. It should be remembered, however, that both classes of applications have distinctly different effects, and that the tension, *i.e.*, the voltage, of the current is a factor that must not be overlooked.

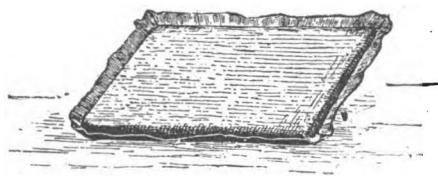


FIG. 20.—GOELET'S CLAY ELECTRODE.

Soft rubber back and absorbent cotton on face of the clay.

When the Patient is Intolerant.—Watch the temperature after each application; if it rises to 102° F. or 103° F., and is fairly persistent, and if there is also considerable pain during and after sittings, the presence of a pyosalpinx or a cystic tumour may be suspected and the treatment should be either abandoned or carried on with much weaker currents.

If there is no marked rise of temperature, and pain is the chief symptom complained of, the current from a long fine wire coil, with extremely rapid interruptions, may be turned on full strength; cathode in-

ternally, and in about ten minutes a numb sensation will be felt in the parts. When this is experienced the strong galvanic current can be usually borne.

Where, in spite of this, the patient is still intolerant of the stronger currents necessary, either ether or chloroform may be given for the first two or three sittings until tolerance is established. Such cases are, however, very rare.

When the negative pole is used internally, especially if there is any inflammation present, the strictest attention must be paid to antiseptic precautions; for the negative pole, forming a soft mass of disorganized tissue in its immediate neighbourhood, favours the absorption of septic matter, while the alkaline products formed by the electrolytic action are not specially inimical to germ life. At the positive pole, on the contrary, the tissues are hardened and condensed constituting a good barrier to septic absorption, and the chlorine formed is a valuable germicide.

Galvano-puncture.

Puncture the most prominent part of the tumour, unless it is in the anterior fossa, or unless pulsation can be distinctly felt.

Use a fine trocar, and push it in a little beyond the beginning of the insulation, unless it is desired to form a sinus. The current is not to be turned on until the trocar is in position. The trocar should never be pushed in to a greater depth than one centimetre.

Rigid antiseptic precautions must be used. In the intervals of sittings it is best to pack the vagina with antiseptic gauze, to guard against sexual intercourse or accidental contamination.

The duration of the sitting should not exceed eight minutes, the time when the current is actually passing only to be counted.

The intervals between the applications should be from eight to fifteen days, and the number of sittings required is usually from three to five.

The current strength should be from 20 to 250 mil-



FIG. 21.—TROCARS WITH INSULATED STEMS.

liampères, according to the toleration of the patient for strong currents.

When the positive pole is used for puncture the needle should be made of platinum, or heavily gold-plated. Apostoli recommends that the puncture should be made by a bare steel needle forming the negative pole; this, in my opinion, has grave disadvantages, and much increases the danger of the treatment. A sinus is inevitably formed, and a direct connection thus established between the vagina and the centre of the mass, a condition which it is evident favours the absorption of septic matter. By the use

of the positive pole, with a thoroughly efficient insulating sheath pushed well through the vaginal wall, this danger is minimized, as the puncture rapidly closes.

If any difficulty is found in withdrawing the needle when the current is switched off, the poles may be reversed and a gentle current passed for a minute or two, when it will be found to come away readily.

The patient should lie on a couch for half an hour after the operation, and on returning home go to bed, and remain there for the whole of the next day. The length to which it is desired to insert the needle may be marked before inserting it by tying a piece of silk tightly round it.

If severe pain and persistent high temperature follow the sitting, the presence of pus may be suspected. This may be evacuated by electro-puncture, but it is not wise to push the needle far in search of it, in view of the danger of opening a pocket of pus into the peritoneum.

Faradism.

The most generally useful method of applying the faradic current in gynæcology is by means of the bipolar electrodes of Apostoli. Bipolar faradization is the method of faradization used when it is desired to localize the current, using one instead of two electrodes. It is a method of considerable value in abdominal treatment, and one in which there is scope for research. Experiment has conclusively shown

that the effect of the applications depends largely upon the length and thickness of the wire forming the secondary coil or the combination of secondary coils which may be used, and again, whether the primary coil is used alone or whether a combination of the primary and secondary is employed.



FIG. 22.—SELF-RETAINING BIPOLAR VAGINAL ELECTRODE.

The bipolar electrode, for whatever situation it is intended to use it, consists of two metallic portions separated from one another by an insulating material, which is usually ebonite. The metallic portions are in connection with the poles of the coil used.

Curiously enough, there is a very marked difference in the effect of the different induced currents when applied by means of such an electrode instead of by



FIG. 23.—ADJUSTABLE BIPOLAR VAGINAL ELECTRODE.

unipolar electrodes. The current from the primary coil, if applied by means of unipolar electrodes to the surface of the skin, or with one pole in the vagina and the other externally, is extremely mild, and seems to produce very little effect; if, however, the application is made by means of the bipolar electrode in-

ternally, the vigorous and powerful effect produced is a matter of surprise to those who have estimated the result by what they have known to happen when unipolar electrodes have been used. Not only are the muscular contractions of extraordinary vigour, but sensory effects, which we have been accustomed to expect only from currents of high tension, are very marked.

In order to get the best effect from the use of the bipolar electrode, it is necessary to use the coil described elsewhere in this work as most suitable for abdominal applications, and it is absolutely necessary to have a clear idea of the effects of each helix and combination of helices, for upon this knowledge must depend the amount of success obtained in treatment by means of the bipolar electrode.



FIG. 24.—ELECTRODE FOR OS UTERI.

The first of the secondary helices in this coil consists of a short and comparatively thick wire, and its effect is, as might be expected, very similar to that of the ordinary primary coil. Applied internally, it excites strong muscular contractions, and may give considerable pain. This current has distinct chemical effects.

The current derived from a combination of the first and second coils is far more severe in every way, but its chemical powers are not marked. The greatest possible care must be taken in applying this current, as very violent shocks may be given inadvertently, and serious mischief be done to the patient. The use of this current is mainly to excite powerful contractions of the uterine muscle to control hæmorrhage, and especially in cases of subinvolution (Rockwell). The combination of the first, second, and third secondary coils gives a current which in its sensory and muscular effects is much weaker than either of the combinations above described, but still distinct. It is a current of less quantity, but vastly more tension.

A combination of the first, second, third, and fourth coils gives a very useful current. It is distinctly agreeable to the patient even when it is administered as strongly as can be tolerated, and its general effects are soothing, while at the same time it acts as a powerful tonic. This is the only current of the series mentioned which is at all pleasant to the patient. It is especially useful for the relief of pain.

Where a current from a short thick wire coil with slow interruptions is used one electrode may be placed outside on the abdomen or on the sacrum. These electrodes may consist of a plate made of rolled tin, lead or Britannia-metal covered with lint or absorbent cotton-wool, and well moistened with a saline solution.

Where a counter-irritant effect is desired, the skin at the point of application should be carefully dried and powdered. The brush electrode is usually employed to produce counter-irritation.

Faradic applications may last from five to fifteen minutes, according to the effect which it is desired to produce.

Where it is desired to develop certain muscles or muscular organs, great care must be taken to avoid fatigue. In such cases it is generally best to allow the current to pass for, say, a minute, then give an

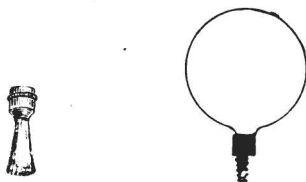


FIG. 25.—BRUSH AND BALL ELECTRODES.

interval of a minute's rest, and so on during the whole application. A coarse wire coil with slow interruptions should be used.

The current from the long fine wire coil, with exceedingly rapid interruptions, is *par excellence* the method for relieving pain; but as it is itself more painful to the skin than the current of quantity from the short thick wire coil, the bipolar electrodes should be always used in applying it, and the strength of the application should never exceed that amount which is

not only quite tolerable to the patient, but actually pleasant.

In using the current of quantity, the limit of tolerance of the patient should be the guide to the strength used.

The coil for the relief of pain in subacute inflammatory states should consist of about 1,500 yards of No. 36 wire, and the interruptions from 20,000 to 30,000 per minute.

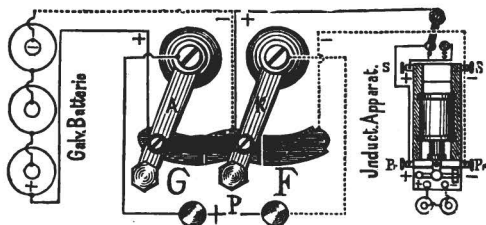


FIG. 26.—DIAGRAM OF CONNECTIONS OF DE WATTEVILLE'S KEY.

The faradic current may be switched on to the wires conveying the galvanic current by means of the De Watteville's key; this often has the effect of rendering the latter more bearable.

In applying faradism to the uterus for displacements, etc., it is best to place the indifferent electrode in the bladder or rectum, so adjusting it that as little tissue as possible separates it from the uterus, that organ lying well between the electrodes.

General Faradization.

If this is efficiently carried out, every part of the body is brought under the influence of the faradic current, with very marked tonic and restorative effects. To give this sitting, the patient will remove her clothes entirely and put on a night-dress and a dressing-gown. The temperature of the room should be sufficiently warm to avoid any danger of a chill. The patient will either stand or sit upon a metal plate of copper or Britannia-metal connected with one pole of the coil. This plate should have a piece of



FIG. 27.—RECTAL ELECTRODE.

lint, wet with a warm solution of salt and water, placed on it so as to improve the contact. Where the patient is able to bear sufficiently strong currents, it is best that the feet should rest upon this plate; but as the passage of the current causes strong contractions of the flexors and extensors at the ankles, the discomfort is more than some patients care to bear. In such cases they can be made to sit upon the plate, and the current will be much more tolerable. The other pole of the coil will be connected to an electrode covered with a moist sponge, which the operator should grasp in his left hand, while he holds in his

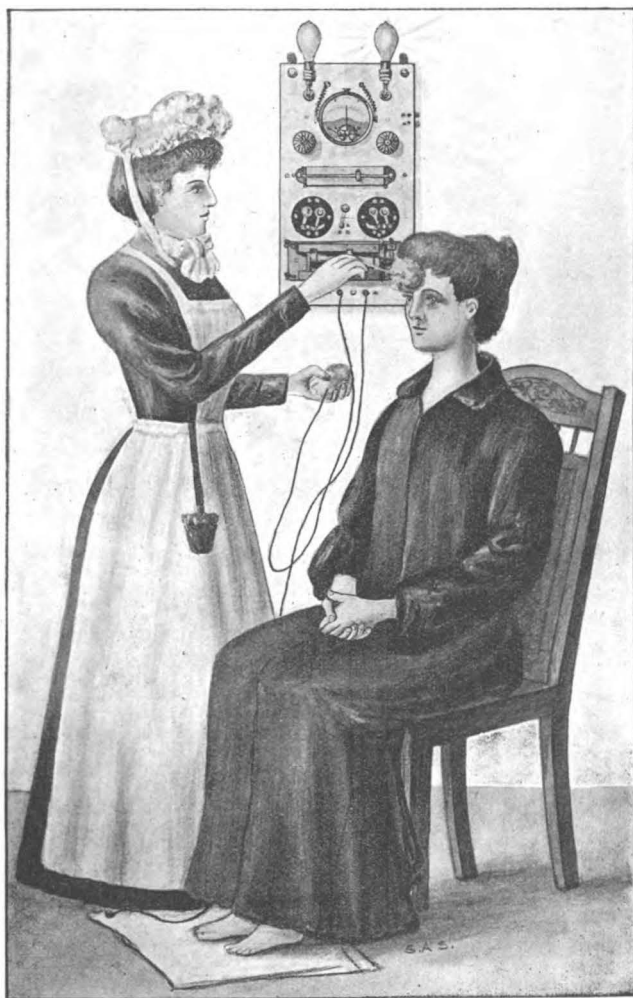


FIG. 28.—GENERAL FARADIZATION (FIRST STAGE).

4—2

right a ball electrode also covered with a sponge moistened with salt and water. With this he makes the application all over the head, neck, throat, body and limbs of the patient. As the current passes through the operator's body he can appreciate the exact strength he is administering, and can increase or diminish it at will according to the tightness or looseness with which he grasps the sponge with his left hand. Very mild currents only can be used on the face and head, on account of the discomfort produced. The hair must, of course, be moistened previous to applying the electrode. Special time and care should be given to faradizing the back and sides of the neck and on either side of the sixth and seventh cervical vertebræ. A strong current must be used for this latter application, and the sponge, thoroughly moistened, be pressed firmly down on the skin. There is no part of the body where a faradic application can affect so many and such important parts as here, the cilio-spinal centre.

As a rule, no current should be used of a strength to be positively painful; in fact, the whole sitting should be agreeable and productive of agreeable sensations to the patient; but in some cases, where there is great nervousness, the feelings of the patient cannot be depended upon as an indication of the strength to be used. In certain parts, such as the cilio-spinal centre and all down the spine, strong currents are *necessary*; but as these parts are not

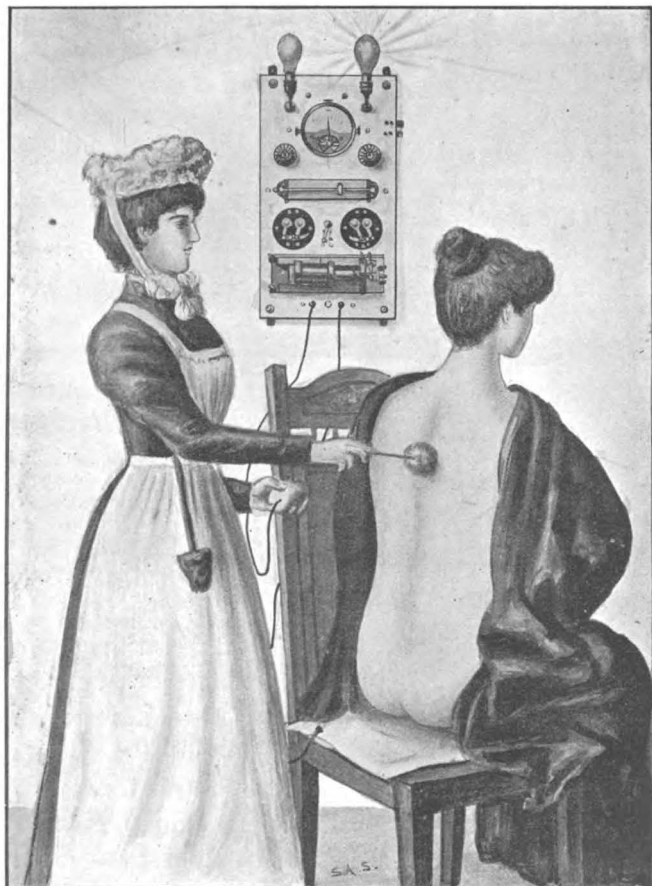


FIG. 29.—GENERAL FARADIZATION (SECOND STAGE).

supplied with a large number of peripheral nerves, the applications do not give much discomfort.

Dr. Rockwell recommends that the sitting should last fifteen minutes, divided thus :

- 'To the head, one minute.
- 'To the neck, sympathetic and spine, four minutes.
- 'To the back, three minutes.
- 'To the abdomen, three minutes.
- 'To the upper and lower extremities, four minutes.'

I am in the habit of alternating these sittings with



FIG. 30.—TROCAR FOR GALVANO-PUNCTURE, WITH ADJUSTABLE SHEATH.

central galvanization, giving one or the other every day.

In some cases the first two or three sittings will bring on the periods; this will not occur after the first time, when the patient has become accustomed to the treatment.

In this, as in all other forms of electric treatment, it is important to remember that '*Le temps n'épargne pas ça qui se fait sans lui,*' and that diseases which are essentially chronic in their character cannot be cured by a few applications.

The action of electricity in equalizing the pulse

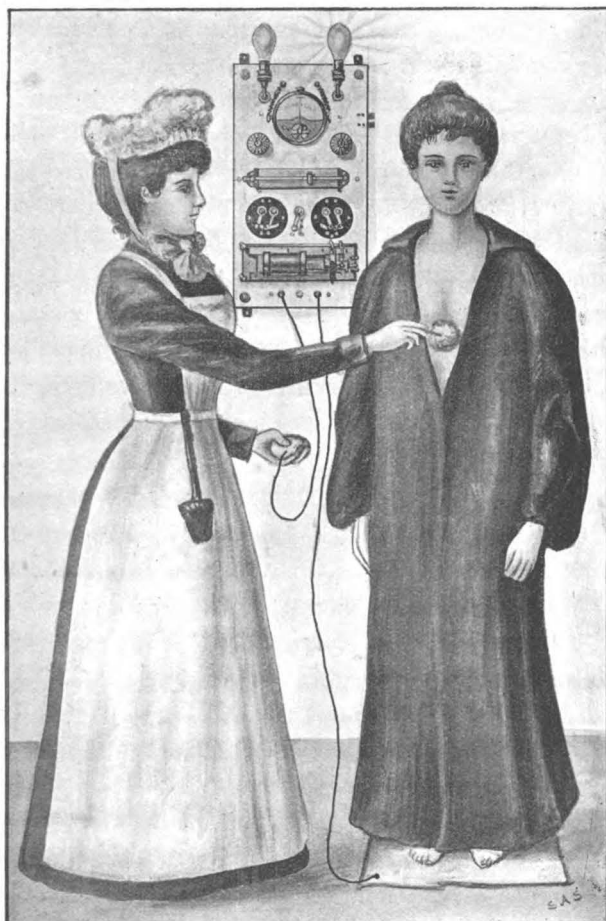


FIG. 31.—GENERAL FARADIZATION (THIRD STAGE).

and temperature is especially noticeable after this sitting. In every case the tendency is to bring both pulse and temperature to the normal.

In cases suited for this treatment every organ of the body performs its function better as a result of it, and the effects are quite as lasting as those produced by any other means. In those few cases where the patient's temperament is unsuited for electric applications, disagreeable sensations will soon show themselves, and their persistency will warn the operator of the fact. The good effects of the treatment are often more manifest after the sittings have been discontinued than while they are being administered.

Central Galvanization.

This sitting is one which has been strongly recommended by many writers. Its object is to bring all the important nerve-centres under the influence of the current. It has been divided by Rockwell into four stages.

In the first stage a large metal electrode so shaped as to fit readily on the top of the head, extending from the roots of the hair in front well to the back of the head, is carefully padded with moistened cotton-wool so as to make as perfect a contact as possible, and placed in position. This should form the plus electrode, the minus being placed on the epigastrium. The current strength used must vary according to the susceptibility of the patient. From 3 to 30, or even

35, milliampères may be used, the usual strength being about 15. The current must be very slowly turned on, and every possible care taken to avoid any break in the circuit when the current is passing. If any marked giddiness is complained of, the current should be made weaker, and after a few seconds it can often be increased again without causing any inconvenience. In all cases it should be strong enough to cause the well-known metallic taste in the mouth. The application should not exceed three minutes, but two will generally be found enough. In some cases of brain disease I have passed currents of 1 milliampère through the head for hours daily with distinct benefit to my patient.

In the second stage the minus is left in the same place as in the first; the plus should be passed slowly up and down the internal border of the sterno-mastoid from the auriculo-maxillary fossa downwards on either side alternately, or two plus electrodes may be used, and both sides attended to at the same time. Five to seven minutes should be spent doing this, the electrode being allowed to rest a few seconds in the fossa each upward stroke.

In the third and fourth stage the spine is treated, the minus still remaining on the epigastrium. Special attention should be paid to the space between the first and seventh cervical vertebræ, the treatment of the cilio-spinal centre being of the greatest importance. The electrode should be moved slowly up and down

the spine for at least ten minutes; and the currents used should be as strong as can be tolerated by the patient with any degree of comfort. Two-thirds of the time employed at this stage should be devoted to treating the portion of the spine between the first and seventh cervical vertebræ.

In all these stages the minus should be large and the contact good.

For the movable electrode a metal ball covered with sponge is best.

Patients, as a rule, do not like the sitting for the first few times the current is administered, but they soon begin to appreciate the good it is doing them.

The Electric Douche.

The galvanic or faradic current should be connected to an inner metallic lining of a vulcanite tube having a ball nozzle or rose; or a thick wire conveying the current may pass down the rubber or vulcanite tube, stopping about a quarter of an inch from the aperture. It is important that there should be a ring of insulating material between the metallic connection and the aperture, as a possible contact when the strong currents necessary are passing would be productive of a very disagreeable and even dangerous shock. There must always be a galvanometer in the circuit when the galvanic current is being used, and the indifferent electrode should be as large as possible.

At a distance of 18 inches, using a solution of salt,

half a pound to 7 gallons of water, with a ball nozzle, it will generally be found that an amount of current passes which is equal in milliampères to one half the volts of the current ; that is, if the pressure is 60 volts, with a $\frac{1}{4}$ -inch jet at 18 inches from the skin, 30 milliampères of current will be passing. With a rose a very much smaller quantity of current would pass under the same conditions. In using faradism, the strength

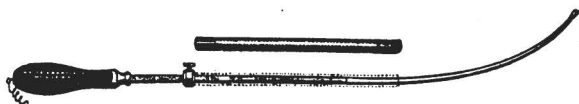


FIG. 32.—INTRA-UTERINE ELECTRODE, WITH ADJUSTABLE SHEATH.

must be regulated by the tolerance of the patient. A very powerful stimulating effect is produced by connecting one pole of a powerful coil—say a coil that will give from a quarter to a half inch spark with three large bichromate cells—with the douche, and putting the patient in connection with the earth by means of attaching a bare wire from a cylinder which he holds in his hand to any convenient gas-pipe. Very intense currents can be sent through the body by these means with very little discomfort.

CHAPTER III.

EFFECTS OF APPLICATIONS.

In treating uterine and peri-uterine inflammations or abnormalities, where one, the active electrode, is placed in the vagina or uterus, and the large indifferent electrode placed on the abdomen or other convenient spot, and the continuous galvanic current used, the action which takes place is—

1. Destruction of tissue, *i.e.*, cauterization.
2. Interpolar and alterative action.
3. Hæmostatic action, immediate or posthumous, according to which pole is used internally.
4. Polarization, with profound changes in the molecules and abnormal structures.
5. Cataphoresis.
6. A cicatricial atresia.

1. Destruction of Tissue.

The cauterization is directly proportionate in amount to the strength of the current, the length of time during which it is passing, and the area of the active electrode, and consequently ceases when the current is turned off. It is caused by the decomposition of the tissues, the hydrogen and gases being liberated at the **negative pole**, and the oxygen and chlorine at the positive. The products at the negative pole are loose, and tend to fluidity; whereas at the positive pole the tissues are condensed, though in actual quantity the products

must necessarily be equal at both poles. The fact that 2 inches of bare sound with a current of 20 milliamperes flowing will cauterize slightly in five minutes may be taken as the basis of a working formula.

2. Interpolar Action.

Interpolar action is both contemporary and posthumous.

Contemporary—a powerful stimulation of muscle fibres, an increased vital and circulatory action, establishing a process of disintegration proportionate to the amount of morbid products present; in other words, there is a reversal and resolution of pathological processes.

Posthumous—polarization of tissue cells resulting in a return current. There is no proof that any direct electrolytic action takes place except in the immediate vicinity of the poles, but indirectly by the stimulation of the vital processes such an action proceeds in the interpolar space, and is continued after the current has been turned off.

3. Hæmostatic Action.

Where the positive pole is in contact with the tissues, a marked contractile and drying action is noticed, and consequently this is the pole to be used in the treatment of all conditions where local hæmorrhage is the most prominent symptom.

The direct action of the negative pole, on the

contrary, is to produce a state of congestion in its immediate neighbourhood; its after-effect, however, especially where a puncture is made, is hæmostatic through the closure of auxiliary vessels, brought about by the rapid atrophy of the morbid products. On account of this tendency to the production of a local congestion, the use of this pole as the active one is to be avoided where pain or a tendency to inflammation is present.

4. Polarization.

The passage of the current causes an electrotonic condition of the local nerves to be set up, varying according to the direction of the current, for it must be remembered that the passage of a current in the same direction as the nerve current increases the intensity and effects of the latter, while if sent in the opposite direction it tends to neutralize it. The effects are prolonged by the polarization of the intervening molecules, the tissue cells acting somewhat as storage batteries.

5. Cataphoresis.

Liquids and solids, even particles of the sound used, tend to pass from the positive pole to the negative. The immediate result is improved circulation and a stimulation of the vital processes.

This property of the positive pole may be most usefully employed in the administration of various medicaments, more especially where a local action is desired.

By dressing the sound with cotton-wool saturated in solutions of carbolic acid, perchloride of mercury, etc., deep antiseptis may be secured, and the cauterant effects increased and accelerated.

6. Cicatricial Atresia.

This results to a limited amount after intra-uterine treatment by the sound electrode. It is caused to a greater extent by the negative than the positive pole.

Effects of Faradism.

The more frequent the interruptions, the greater the physiological effect and the less the sensory effect. When the interruptions exceed 25,000 in the minute, a powerful sedative and anæsthetic influence is exerted.

If a thick wire coil and slow interruptions are used, the one pole being placed on the lumbar spine and the other resting against the os or in the uterus, strong and tetanic contractions of the uterine and peri-uterine arterioles result, together with contractions of the voluntary and involuntary muscles in the neighbourhood of the poles, or supplied by nerves acted upon by the poles.

All faradic applications have been found to increase the respiratory exchanges by excitation of the muscular and sensory nervous systems (D'Arsonval), though prolonged applications have the effect of lowering pulse and temperature. The experiments of Debedat

prove that considerable stimulation of trophic and nutritive processes takes place when the induced current with slow interruptions—from five to thirty in the minute—is used. In his experiments, a rabbit's limb was subjected to a daily application of faradism for twenty days, the current being passed for one second, followed by an interval of one second. The limb experimented upon increased considerably in size.

CHAPTER IV.

DISORDERS OF MENSTRUATION.

As all disorders of the catamenia must be considered as symptoms of some other definite abnormal condition in the majority of cases, and as their successful treatment entirely depends upon the accuracy of the diagnosis of such cause, the treatment will naturally be found more exhaustively dealt with under these headings.

Amenorrhœa.

. For purposes of treatment the most suitable classification would be : Primary and secondary.

Primary Amenorrhœa.—This is when menstruation has never taken place, or only to a very imperfect extent. The cause is usually to be found in an insufficient development of the sexual organs, or in

continuous or excessive calls upon the muscular system. This latter form of amenorrhœa is comparatively common amongst women who earn their living by gymnastic displays, and if their training dates from a period antecedent to puberty, the appearance of the catamenia is much delayed and rarely is normal.

Another frequent cause is the presence of certain

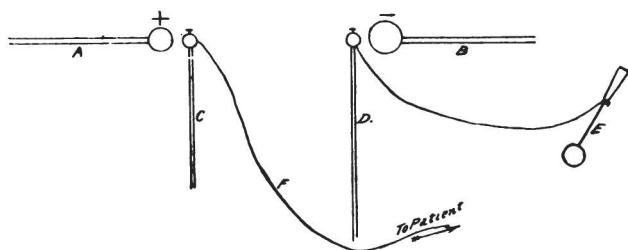


FIG. 38.—ARRANGEMENT OF THE DISCHARGES OF A WIMSHURST MACHINE FOR REGULATING THE STRENGTH OF SPARK ADMINISTERED BY INCREASING OR DIMINISHING THE SPARK-GAP.

diseases, such as phthisis or chlorosis, which may delay the onset of menstruation for a considerable time.

Treatment.—One of the most valuable forms of treatment is by means of static electricity. Sparks should be drawn from the lumbar region for about fifteen minutes daily. This is best done by allowing the patient to wear a thin woollen or silken garment, and gently rubbing up and down over the lumbar

vertebræ with a ball electrode connected with a static machine, while the patient holds in her other hand an ordinary handle electrode connected with the other pole of the static machine. If the organs are fully developed, one application is very frequently successful, though it may be necessary to persevere for a few days.

In more obstinate cases, or where the organs are in an infantile condition, the combined current is the most suitable. One electrode—a large one—should be placed over the lower lumbar vertebræ, and the other—preferably the minus—on the suprapubic region. The current strength should be from 15 to 25 milliampères, and the length of sitting about twenty minutes. The faradic coil should have a long, fine secondary, and the interruptions should be extremely rapid. In the special coil recommended, the combination of the three secondaries will be used.

The number of applications required is usually from four to twenty, unless the trouble is due to an infantile uterus. When this is the case treatment takes from two to four months at least.

In the rare cases where both the previous methods fail to produce satisfactory results, a bipolar intra-uterine electrode (Fig. 18) may be used.

The prognosis is, as a rule, good, and the flow, when once established, can be increased by subsequent applications. When the cause is an infantile condition of the sexual organs, treatment with the

combined current will usually bring the uterus up to a normal size, and generally induce a more perfect development of the whole sexual system.

In young married women where sexual feeling is completely absent, or is present in only a slight degree, a condition which is becoming increasingly frequent, this form of treatment will quickly produce and increase it.

Secondary Amenorrhœa.—The causes of this condition may be roughly grouped under five heads:

1. Constitutional disease.
2. Nervous reaction.
3. Local disease.
4. Removal of the ovaries, etc.
5. Menopause.

The secondary form of amenorrhœa must be treated strictly according to the cause. When this is found, and removed where possible, a cure can promptly be brought about by the use of similar applications of faradism as recommended in the primary form.

The amenorrhœa which is so frequently found in obese young women is usually due to anæmia or chlorosis, with the depressed nerve tone which is invariably present. In such cases general faradization, or, what is still better, stimulation of all the peripheral nerves by means of mild static sparks drawn through the clothing, is necessary. The continuous current may be also used with great advantage. The positive pole should be placed

successively on the upper cervical vertebræ, the lower dorsal, the angles of the jaws (to deal with the sympathetic nervous system); the minus being applied to the lower lumbar vertebræ in the first two cases, and on the epigastrium in the last. Current strength never to exceed 15 milliampères, and may with advantage be less than this. The length of each application should be about ten minutes, with the exception of the last, which should only last three minutes on each side.

Suppression of the menses through cold or shock may be treated with great advantage by means of electricity. In such cases a few sparks taken from the lumbar vertebræ are very often sufficient to restore the function after one or two applications.

Menorrhagia.

An increased blood-supply to the uterus from any cause, or an increased area of active secreting surface, more especially if inflamed, usually gives evidence of its existence by causing an increased flow at the menstrual or intermenstrual periods.

Another very frequent cause of menorrhagia is a congested or inflamed condition of the extra-uterine pelvic organs.

Idiopathic menorrhagia is the name given to that very rare condition where no lesion of the uterus or associated organs can be detected, even by the most careful examination. Cases of this character have

been met with where the bleeding was so severe as to seriously endanger life. Other forms of menorrhagia, where the discharge is due to the presence of morbid growths and as the result of chronic inflammation, will be best dealt with under these headings.

In most of the cases of menorrhagia which come to us for treatment the cause can be readily detected, and the suitable treatment will be found described under the appropriate heading. In all forms of uterine hæmorrhage there are, however, some general rules for electrical treatment which should be observed. Firstly, the **positive** pole should always be used as the intra-uterine pole, and in *no* case where hæmorrhage is a symptom or is likely to occur should the negative pole be used internally. Neglect of this rule will not only interfere with the beneficial effect of the applications, but may cause hæmorrhages of a dangerous character.

Secondly, as it is desirable to get a cauterant effect, the current should be strong, up to 50 milliampères, or even more, if the patient can tolerate it. The greatest possible care should be taken to prevent the patient receiving even the slightest shock, and no stronger current should be used than can be borne comfortably. If, however, the external electrode is as large as possible, and well soaked with a solution of salt in water, it will be found that considerable currents may be used without any inconvenience.

Where currents of a strength of from 40 to 100

milliampères are used, the sitting should only last about eight minutes, and be repeated about two or three times a week, according to the condition of the patient. While there can be no doubt that cures are more rapidly effected by the use of currents of not less than 50 milliampères, yet it should be remembered that far milder currents applied more frequently, and for much longer periods, will produce a practically identical effect.

If the patient be given 5 to 15 milliampères—according to effect—daily for half an hour, and is directed to use a copious douche of water with a temperature of 120° F. every morning and twice daily during her periods, very satisfactory results, which compare most favourably with any other form of treatment, will be brought about.

Dysmenorrhœa.

There is no more frequent class of case to be found in the gynæcologist's consulting-room than that where painful menstruation is the chief symptom, and there is certainly no symptom which gives rise to such prolonged misery, which renders life to so many a very burden, and the approach of each monthly period a haunting terror, as the suffering during menstruation to which the name dysmenorrhœa has been given.

In most of these cases we have to deal with not only the periodical pains, but also with a host of reflex and sympathetic phenomena due mainly to

ovarian changes, which tax the skill and resources of the physician to the utmost.

The causes of dysmenorrhœa are many. It may, however, be said at once that anything which tends to produce congestion of the uterus or associated organs will certainly cause painful menstruation. The existence of chronic inflammation in the uterus interferes with the normal periodical disintegration of the mucous membrane, and is frequently the cause of localized or general contractions of that organ. At this time the presence of any obstruction, however slight, to the free flow tends further to increase the congestion and pain. In the anæmic and chlorotic girls who are so frequently sufferers, it will generally be found that the sexual organs are in an undeveloped condition and that the uterus is small and anteflexed.

A hyperæsthetic condition of the mucous membrane lining the uterus is frequently the cause of the pain, and this is present even when the local congestion is very slight indeed.

For the successful treatment of dysmenorrhœa, an accurate diagnosis of the cause is of the greatest importance. The character of the pain, the relation its time of occurrence bears to the appearance of the discharge, the exact situation of the pain, and the age of the patient, are all of the greatest assistance in forming an opinion as to the probable cause and the best line of treatment to adopt.

In that class of cases where the uterus is in an un-

developed condition, and considerable anteflexion is present, the pain usually appears before the flow, and is most severe in the loins. This is supposed to be due to the difficulty the blood meets with in distending the body of the uterus. Whether this theory accurately describes what takes place admits of some doubt, but that the pain is due to a congested condition of part of the uterus owing to the existence of the flexion is certain.

Where the painful discharge contains shreds of membrane and belongs to the type known as membranous, the symptoms are of an entirely different character. The pains are sharp, spasmodic, and of a colicky nature. They invariably accompany instead of preceding the flow, and are felt mainly in the lower part of the abdomen. Of all cases, these are the most difficult and unsatisfactory to treat. Where inflammation is actually present and the uterus is in an unhealthy condition, the pain assumes a spasmodic character. It is felt at the pubes, it is intermittent, and it is distinctly '*bearing down.*' This latter is a distinguishing characteristic, and, taken in connection with its intermittent nature, makes the diagnosis sure. The pain is relieved by the appearance of the discharge, though it in some cases recurs for the last day. The direct cause is supposed to be a spasm of the uterus, the organ, owing to the inflammation present, being in a hyperæsthetic condition.

Where the dysmenorrhœa is due to extra-uterine causes, the uneasiness, gradually passing into pain, appears from three days to even a week before there is any sign of a menstrual flow. Here the pain is due to either tubal or ovarian mischief, and this condition is very amenable to judicious electric treatment combined with the persistent and persevering use of hot douches.

In many cases where the mischief is not important, the relief obtained when the flow appears is marked, but where the tubes are implicated this is never the case. If there is much endometritis present, the pain is usually very intense and is not at all relieved by the flow.

There is no class of case which the gynæcologist is called upon to deal with that requires more patience in the treatment and more skill in the diagnosis of the cause than those in which pain preceding, during, and subsequent to the menstrual flow constitutes the symptom which leads the patient to seek for relief. Electricity alone can do much to relieve, and even to cure; but where the really brilliant results are met with is where electricity is used in combination with suitable local and general treatment. Without the use of electricity the treatment of dysmenorrhœa has ever been a long and very tedious matter, and the results obtained in a large number of cases have been anything but satisfactory. The very length of the treatment and the constant attention which the

patient has to give herself have made it quite out of the power of those not blessed with much of this world's goods to hope for a cure. In the treatment of all classes of this affection, rest and complete absence from sexual excitement is of the highest importance. Constitutionally, and in her surroundings, the patient must be placed under the most advantageous circumstances. Locally every effort should be made to stimulate the circulation in the pelvic organs, to get rid of the congestion and the hyperæmia. Constipation must be guarded against, for in this, as in all other pelvic affections, there is nothing which retards the cure and produces a constant aggravation of the symptoms so much as a loaded bowel. In a large number of instances the very simple remedy consisting of a glass of cold water taken before rising in the morning will be found effective in securing a daily motion, though in more obstinate cases it may be found necessary to use some saline, such as Carlsbad salts. In my own experience with cases of habitual constipation, I have found a mixture consisting of magnesia sulphate with the acid infusion of roses, taken three or four times a day, very useful indeed. Any such remedy, however, can soon be dispensed with, for the stimulating action of electricity soon induces a regular action of the bowels. Locally, hot douches, the occasional use of glycerine tampons, and the periodical painting of the vaginal roof with a diluted tincture of iodine, are

all useful in removing the congestion of the parts. Ichthyol has been very strongly recommended, and there is no doubt that its *regular* use has a marked effect in removing local congestion. I have been in the habit of inserting a tampon soaked in glycerine and ichthyol after each day's electrical application, and have found improvement is brought about more rapidly than when using the current alone.

The particular form of electric application, as mentioned before, must necessarily depend on the nature of the abnormal condition present. Where there is much tenderness on pressure, fine wire faradism, with the painful part as much as possible between the poles, should be used. In the coil described the combination of the four secondaries with very rapid interruptions is best. This should be administered daily, each application lasting about twenty minutes. The intra-uterine electrode is useful in almost every case, and it should always constitute the positive pole. Endometritis is frequently present, and must be treated as before described. The use of the sound electrode with currents of from 20 to 50 milliampères for about ten minutes three times weekly is most effective in improving the general condition by stimulating the pelvic circulation, allaying the tendency to spasm, and by its cauterant action on the endometrium. These applications will not be made during the first three days of the flow, but during this period the current may be applied externally, the

plus consisting of a large electrode placed over the lumbar vertebræ, and the minus of a somewhat smaller one placed over the ovaries. Current as strong as can be borne without inconvenience, and length of application about a quarter of an hour. In some cases the combined current will be found more effectual in allaying spasm.

Where the dysmenorrhœa is due to an undeveloped condition of the uterus and pelvic organs, the faradic current derived from a combination of the first three secondaries should be used, the interruptions being moderately slow. As obstruction to the flow is generally found in these cases, the minus intra-uterine electrode, with a continuous current of about 30 milli-ampères, may be used for fifteen minutes twice weekly, faradism being applied by means of the unipolar and bipolar method four times a week for two or three weeks, and afterwards every third day. The faradic current should not be applied for more than ten minutes at a time, to avoid fatiguing the parts.

The faradic douche is very useful in many cases of dysmenorrhœa, even when the pain arises from very different causes. It acts by improving circulation and giving 'tone' to the parts.

Central galvanization may be used with advantage in all cases; it should be given three times weekly.

In the great majority of cases which are treated electrically, if the proper methods have been employed, entire relief from pain is obtained.

CHAPTER V.

MENOPAUSE.

THAT time of a woman's life when the special functions of the uterus and ovaries cease is the period when these organs are particularly liable to be affected with disease; and as this period of her life is one usually attended with constitutional disturbances of many kinds, it is advisable for the medical man, when called to treat a patient believed to be suffering from the nervous disturbances associated with this condition, to make the most careful examinations in order to assure himself of the absence of any organic disease.

It must also be remembered that the profuse discharge and the presence of large clots, which are often the reason of the patient coming to our consulting-rooms, are not always to be regarded as pathological; in the absence of such a discharge, either directly or from some vicarious source, symptoms of the most disagreeable character frequently occur. The flushings of the face, the intense depression, the irritability of temper so frequently present, are promptly relieved by a free discharge, and it is only when this is obviously excessive that any measures should be taken to limit its quantity.

As most of the unpleasant symptoms are due to nervous disturbance of the ganglionic systems with which the uterus and ovaries are so largely sup-

plied, careful electric applications can do much to relieve.

In such a state, where it is possible to use electricity regularly, I would strongly deprecate the use of that very popular drug, bromide of potassium. Its use invariably retards the action of electricity, and does much to keep up the unsettled nervous condition.

It is, in the first place, very important to vigorously combat the constipation which is one of the most usual symptoms present. This may be treated by the application of the combined current to opposite diameters of the abdomen, using electrodes about $1\frac{1}{2}$ inches in diameter. They should be placed on opposite sides of the abdomen, leaving them on each place about five minutes, and moving them successively all round the circumference of the abdomen. The continuous and faradic currents should be as strong as can be comfortably borne, and the faradic interruptions from 80 to 100 a minute, using the primary current or a combination of the first three in the special coil. Every second day a large plus electrode, well moistened with salt and water, should be placed over the liver, and the minus placed on the perinæum extending over the anus, or in the rectum. Combined current, strength 5 to 10 milliampères, faradic interruptions moderately slow, the faradic current to be as strong as can be comfortably tolerated. A few of these sittings given alternate days will in most cases cure the constipation.

The nervous troubles can be greatly benefited by faradism. A very fine wire coil—in the special coil the four secondaries combined—should be used, and a bipolar electrode inserted on alternate days in the uterus and in the vagina. This will stimulate function, and do much to relieve the congestion which is an important cause of the general morbid condition. This application may be supplemented by the regular use of the vaginal faradic douche, with or without the faradic bath.

CHAPTER VI.

PELVIC EXUDATIONS AND ADHESIONS.

THIS is the most frequent, perhaps, of all affections which the gynæcologist meets with. Treatment should be commenced, if possible, immediately after acute symptoms have subsided. If applied during the acute stage, the exudation might be increased; while, on the other hand, its value is not so marked after organization of the deposit has proceeded far.

Applications should be intravaginal, the electrode—preferably the minus—being placed against the inflammatory exudation where felt in the vagina. The electrodes are best made of carbon, and if it is desired to avoid all caustic effect, they should be covered with a thin layer of absorbent cotton-wool, moistened with salt water. Where adhesions are extensive and

important, good results may often be obtained by using a positive electrode in the vagina, the cotton-wool covering it having been soaked in a fairly strong solution of potassium iodide. Current strength should be from 30 to 100 milliampères for ten minutes daily for a few days, and then every third day until the deposit has completely disappeared. It is well to make an occasional application even after the apparent disappearance of the exudation, in order to effect a complete cure. If the case can be seen daily, very mild currents, say from 5 to 20 milliampères, may be used for half an hour each day, the progress being as rapid as when stronger currents are used, after the first appearance of resolution.

When the stronger currents are employed, from twenty-five to thirty applications are usually necessary; in the case of milder currents, it is impossible to make even an approximately accurate forecast, as this depends upon when the first improvement takes place.

Apostoli and Goelet have both recommended that the treatment should be commenced in the acute stage if possible, by the use of faradization from a coil consisting of a long and fine wire. It should be applied once, or even twice, a day, each application lasting till the pain is relieved. This usually takes from fifteen to thirty minutes.

In the subacute stage galvanism should be used. Current strength 15 to 25 milliampères, with the plus pole internally. Applications to be made daily.

When the exudation forms a large bulging mass well down in the vagina, by far the best results are got by puncture. At first the needle should form the minus pole. Gradually increase the current to 50 milliampères on the first day, and at subsequent sittings increase to 100 or 150 milliampères; the effect of this treatment is most marked. After about six applications a decided diminution in the size of the mass may be expected; when this is noticed no further punctures need be made, and treatment with the intra-uterine sound may then be commenced.

Perimetric exudations are more rapidly absorbed than parametric (Milne Murray).

Severe pain coupled with marked rise of temperature after the applications are contra-indications; and if these occur the treatment should be suspended for a time, and if resumed should be carefully watched and pursued tentatively.

The presence of pus must be always looked upon as a contra-indication to the application of electricity, though it does not necessarily preclude its use.

As to the prognosis, it is beyond question that in this form of pelvic disease the use of electricity, properly applied, produces the most brilliant results.

Complete absorption of the deposit and restored mobility of the parts may be confidently looked for.

Progress is always much more rapid where electro-puncture is used, but it should be remembered that though with proper precautions this is a safe opera-

tion, yet it is a far more serious matter than the application of the current to the unbroken skin or mucous membrane.

Great attention should be paid to the general health during treatment; and above all, constipation should be vigorously combated, as any accumulation in the bowel causes an aggravation in the symptoms.

If a static machine is available, fairly strong sparks drawn from the lumbar region seem to have some influence in hastening the process of absorption.

CHAPTER VII.

UTERINE INFLAMMATIONS.

THE catarrhal inflammation so frequently found in young anæmic girls is mainly due to a lowering of the nerve tone. This form is invariably accompanied by menospasm. The periods are generally very painful, the pain not being relieved by the flow, and sometimes persisting for a day or two after the cessation of the discharge.

Constitutional treatment is of the greatest importance. The static bath, general faradization, or small static sparks drawn from every part of the body and limbs, may each and all be of the greatest service, either employed alone or as adjuncts to medicinal treatment.

The static bath I have found particularly useful in these negative cases, as it seems to stimulate function in quite a remarkable way.

The local treatment should be commenced by the application of a large positive electrode to the sacrum and lower lumbar vertebræ, and a large negative over the lower part of the abdomen. A current strength of 20 to 60 milliampères may be used, the greatest care being taken to prevent any burning of the skin or much pain, and the strength of the current being regulated entirely by the sensations of the patient. If the external treatment is not effective in removing the symptoms, it will be necessary to have recourse to intra-uterine applications. A platinum sound electrode will be used, and the indifferent electrode placed over the lower lumbar vertebræ; current strength from 15 to 50 milliampères, and the length of sitting varying from half an hour to five minutes; the stronger the current used, the shorter the application. I have generally found that currents of about 20 milliampères for fifteen minutes daily produce the best results.

In such conditions, dependent more or less upon perverted nutrition, constitutional treatment is necessary if the local applications are to effect their purpose. Electricity is a tonic of remarkable efficacy, and is a powerful stimulant of endosmotic action. The increased rapidity with which fluids acted upon by the current pass through animal membranes

very clearly shows this, and this power is not the least important that it possesses in the treatment of what may be called stagnant conditions of the system.

CHAPTER VIII.

METRITIS.

THIS affection is invariably the result of the products of a germ action and tissue reaction, the former acting as the continuing cause, and the latter as the remaining and visible disease.

In its chronic form it may be divided into two classes:

1. Where the disease is purely local.
2. Where the whole nervous system is profoundly and sensibly affected.

In the first class the indications for treatment are to stimulate the uterine tissue in its contest with germs, to remove the congestion by promoting muscular contraction, improving the circulation and remedying the relaxation usually present.

The treatment should be commenced with the vaginal application of the positive pole in the form of a cotton-covered carbon ball, using a current strength of from 15 to 30 milliampères, the indifferent electrode being placed over the lumbar vertebræ.

The anæmia thus produced locally is distinctly sedative, and inhibitory of vital exchanges.

This sitting may be followed by the application of faradism, using a coarse wire coil and slow interruptions.

Faradism may be applied either by means of the bipolar vaginal electrode or the faradic douche. Where the relaxation is not very marked, I have found the faradic douche, using at first hot and gradually changing to cold salt solution, is preferable.

The chemical action of the galvanic current is far the most suitable form of application in these cases; and though the faradic current is to be used for its effect on the local circulation and its bracing properties, the disease proper is affected by the galvanic applications only. The intra-uterine sound electrode must be used after the first three or four sittings, and the choice of pole to be applied internally depends entirely upon the nature of the symptoms. As has been explained before, where hæmorrhagic symptoms dominate, the positive is the proper one to be used internally; in, however, the old and indurated forms of chronic metritis met with mainly in multiparous women, the negative pole should be invariably used as the intra-uterine pole. In such cases the negative pole possesses valuable liquefying properties, and is far more effective in restoring the circulation in the diseased tissue than the positive pole would be.

As a strong cauterant action on the endometrium is

necessary, a strong current should be used—never less than 30 milliampères, and generally up to 50—the current being allowed to pass for about ten minutes, the length of the application depending upon the amount of cauterization desired. Where the constitutional symptoms are prominent in the second class of cases, too much caution cannot be exercised in administering the treatment. Though the presence of pus in the tubes does not absolutely prevent electrical treatment, yet it necessitates the use of much caution and far milder currents. In such cases, begin with vaginal applications, and then, if no great pain or other symptoms of pus show themselves after two or three applications, use the positive electrode in the uterus to commence with. Let the sound be dressed with cotton-wool saturated with pure carbolic acid, and pass as strong a current as the patient can comfortably bear. This should be used for the first six or eight applications, after which the undressed sound may be employed.

The prognosis is good, but it largely depends on suitable constitutional treatment being administered at the same time.

The static bath, central galvanization and general faradization are powerful adjuncts in restoring the depressed vital exchanges, in stimulating the natural processes carried out under the influence of the sympathetic nervous system, and in improving the muscular tone.

CHAPTER IX.

ENDOMETRITIS.

THE electrical treatment of endometritis can be undertaken with every hope of effecting a cure, or, at worst, giving great relief from the distressing symptoms which are so common in this affection.

In the virginal form especially, every effort should be made to improve the general health while attending to the local mischief.

The continuous current should be used, and applied daily. It is difficult in these cases to lay down the current strength which ought to be employed, as this will vary largely according to constitutional peculiarities; but as a rule it will be found that about 20 milliamperes can be tolerated. The negative pole should be placed over the uterus and the positive placed on alternate days over the upper and lower lumbar vertebræ. The electrodes should be at least 6 inches square.

Usually the beneficial effect of this treatment will soon become manifest, most of the troublesome symptoms disappearing; but it is seldom possible to effect a cure by external treatment alone, unless this is spread over a very considerable time. Where improvement does not seem to take place after, say, a dozen applications, a rectal electrode should be employed, and passed up sufficiently far to approach as near as the parts allow to the uterus. In this

application the uterus should lie directly between the two electrodes, and great care should be taken, by using only mild currents, not to injure the bowel.

Where these applications prove unsuccessful, or in the case of a married woman, an internal treatment should be at once commenced. The choice of the internal pole should depend on whether hæmorrhage is a prominent symptom or not, for where hæmorrhage is present the negative pole should never be used internally. In cases, however, where this is not marked, I have found more benefit is derived by making the intra-uterine pole the negative one. The indifferent electrode should be placed on alternate sittings over the abdomen and over the lower lumbar vertebræ. The current strength should be at least 40 milliampères, and may with advantage, especially in hæmorrhagic cases, considerably exceed this amount. The intra-uterine electrode had better be a platinum sound carefully insulated, so that the body only of the uterus will be touched by the metallic part. I have generally found that pain and discomfort is experienced by the patient when the neck of the uterus is exposed to the cauterant action of the current.

The sittings should be given two or three times a week, according to the condition of the patient. An abnormally high temperature at the time of the proposed application should always be considered as a contra-indication. The cases which are most suitable for electrical treatment are those in which the milder

methods, such as the application of caustics, have failed to effect a cure, and the more serious procedure of curettage seems to be the only alternative. Though this operation is often very lightly undertaken, it is attended with no little danger, even in the hands of the most experienced, and, moreover, in a very considerable number of cases it fails to effect a permanent cure. Electricity, on the contrary, brings about far more permanent results, though it necessarily causes the treatment to extend over a much longer period, and it possesses the great advantage of being practically safe if certain simple precautions are used. I am, however, convinced that this period of treatment can be considerably shortened, and with equally good results, if the applications are of sufficient strength and are given daily.

A class of case in which the benefit of electrical treatment is particularly marked is that in which the symptoms have returned after curettage. These are generally very obstinate to the usual forms of treatment, but they can be rapidly and permanently benefited by judicious electrical sittings.

In choosing a treatment for any case of endometritis, we should be guided by the prominence of any one of the three most frequent symptoms, namely, hæmorrhage, leucorrhœa, and local and sensory disturbances.

In the hæmorrhagic variety of the disease we have the endometrium much thickened, rugose, and with a

great development of bloodvessels. This, perhaps, is the most usual class of case appearing for treatment.

Next comes the glandular. Here we have a thickened membrane, an excessive and characteristic development of the glandular elements, with the consequent profuse discharge, varying from a watery character to a thick greenish-white. In the third kind, the granular, there is a purulent or muco-purulent discharge, and a growth of granulations of a low type on the endometrium.

It may be taken for granted that in almost every case the uterus is enlarged and flabby.

In the first variety—that is, the hæmorrhagic—the positive pole in the form of a platinum or carbon sound should be in the uterus, and here a much stronger current is necessary than in either of the other forms. The indifferent electrode may consist of two pads instead of one, both of them as large as can be conveniently adjusted, the one to be placed over the abdomen, and the other over the lower lumbar vertebræ and the sacrum. As in all cases where strong currents are used, it should be turned on very gradually—to, say, 50 milliampères at the first sitting, and at subsequent sittings to 100 or 150 milliampères. It will be often found, where a patient complains of pain while the current is being turned on, that by pausing for a moment and turning it off slightly she will be able to bear a further increase without pain. It should be remembered that, with the exception of

the few cases which are intolerant of even small quantities of electricity, it is possible, if proper precautions are used, to employ currents of 200 or even more milliampères without any marked pain, while a careless application of even one-twentieth of this quantity may produce intolerable burning and severe injury to the skin and mucous membranes. The cauterant effect of the bare sound on the endometrium is absolutely in proportion to the strength of the current, the amount of conducting surface in contact with the membrane—the smaller the surface, the more concentrated and powerful the effect—and the length of time during which the current is allowed to pass.

Where the stronger currents are used, the length of sitting should not exceed ten minutes twice weekly.

I have found that the period of treatment can be much shortened if these sittings are alternated with longer ones of half an hour's duration with a current strength of, say, 15 milliampères.

When employing the stronger currents, every precaution should be used in the passage of the sound, as any pain or discomfort caused by this operation will absolutely prevent the use of currents sufficiently strong for our purpose.

After the patient has had four or five sittings, a carbon-tipped sound insulated to within half an inch of its extremity should be passed, and then, as the current is flowing, gradually moved downwards so as to intensify the action by localizing it.

Some cases are far more intolerant of the current than others, but by carefully adhering to the precautions detailed above it will generally be found that after one or two sittings the full strength necessary can be used. A frequent source of discomfort and burning pain is from small lumps of salt entangled in the covering of the electrode and in contact with the skin. In other cases the intolerance is due to great sensitiveness of the skin to electric tension. This can be best remedied by having one or more thicknesses of flannel between the electrode and the skin, the outer layer well moistened with saline solution, and the layer or layers nearest to the skin moistened in a much slighter degree with plain water only. Diminishing the skin resistance by first washing with ether and then sponging with a saline solution will also help. Where it is the internal pole that gives pain, the sitting should be commenced with fine wire bipolar faradism until the parts are somewhat numbed.

The prognosis in these cases is very good. It may be looked upon as certain that electricity can cure every case that can be cured by curettage, and a large proportion of those which curetting would not cure.

Usually from fifteen to thirty applications are necessary where the strong current is used, but in any case after that number of sittings it is well to give the patient a rest for a month or two.

CHAPTER X.

SUBINVOLUTION.

IN most of the cases of subinvolution which come under our notice the uterus is in the early or congestive stage of metritis. The pathology of this condition at once gives the indication for treatment. In most respects the treatment is identical with that recommended for a general relaxed condition of the uterus and its supports.

It is necessary, in the first place, to give tone to the uterine muscle, and so to relieve the congestion which is the prominent feature of the condition.

Treatment.—For the first three or four sittings a bipolar intra-uterine electrode with a tolerable current from a short thick wire coil should be used, and the interruptions should be moderately slow. The best results will be obtained by using a combination of the first three secondaries of the special coil described, also with slow interruptions. After the third or fourth sitting a platinum or carbon intra-uterine electrode will be used as the positive pole, and a small minus pad, so as to localize the current, placed on the abdomen over the uterus. The first sitting should last about twenty minutes, and the last for about ten. In the last sitting, before removing the sound the small abdominal pad should be replaced by a large one, and the continuous current switched on

in combination with the faradic, the intra-uterine sound still remaining the positive pole. A current strength of from 50 to 100 milliampères may be used with advantage.

This latter part of the sitting should last for about five minutes, the current, of course, being slowly switched on and off. It is used in order to cauterize the endometrium, which is generally in an unhealthy condition in this affection.

After about twelve applications the uterus will be greatly diminished in size, and the menorrhagic and leucorrhœal discharges will either have completely ceased or will be much improved. As is usual in the cases treated electrically, a sense of pelvic 'well-being' will be felt by the patient, replacing the sensations of weight and discomfort previously complained of.

As a rule, after about fifteen applications the improvement will go on without any further electrical stimulation, but in rare cases it may be necessary to give three or four sittings, at intervals of a month, before the uterus has quite regained its normal condition.

CHAPTER XI.

UTERINE HYPERPLASIA.

HYPERPLASIA is an affection of the local trophic processes, very frequently occurring as a sequence to neglected subinvolution. Here there is a perversion of the nutrient supply, so that the organ is rendered incapable of maintaining in an efficient state the higher elements of its tissues. The proportional replacement of worn-out cells is disturbed, and the lower element—that is, the connective tissue—becomes developed with a rapidity and in a quantity in excess of the normal, with a resulting hyperplasia of the organ. In this affection the obvious indications for treatment are, firstly, to cause absorption of the lowly-organized tissue, and then by stimulating the trophic nerves to enable them to bring about the development of the higher tissue elements.

Treatment.—From what has been said before, it will be apparent that faradism will be of no use whatever in the earlier treatment of this condition. The continuous current will be used with as large a milliampèrage (up to 150) as can be tolerated with comfort.

A uterine sound dressed with moist cotton-wool will be used in the uterus as the negative electrode, insulated carefully from the vagina and cervix. Two positive electrodes will be used, the one, 6 inches by 4

in size, being placed on the back of the neck, and the other, 10 inches by 8, placed over the sacrum.

The length and the frequency of the sittings should be directly proportional to the strength of the current used. Thus, if 150 milliampères are passed, five to ten minutes every third day will be sufficient, while if 10 to 15 milliampères only are employed, twenty minutes every day should be given.

I have found mild currents, employed over long periods and frequently, more effectual than the stronger ones.

Attention should be paid to the general health and the condition of the bowels should be carefully regulated. Where constipation exists, a daily dose of Carlsbad salts taken in cold water before breakfast in the morning will prove a useful remedy.

Gentle exercise may be taken during the treatment, but all fatiguing pursuits should be abandoned. Horse exercise and cycling should be strictly forbidden.

CHAPTER XII.

UTERINE PROLAPSE.

UTERINE prolapse, however caused, is invariably associated with, firstly, a change in the size of the organ, and, secondly, a relaxation of those structures upon which it mainly depends for its support. But what-

ever the exciting cause or causes may be, it is manifestly of the greatest importance that they should be recognised, as upon the correct diagnosis of such the character of the treatment and its success to a large extent depends. Simple relaxation, where the organ is found in a state of abnormal mobility, is rarely to be found existing alone. In far the greater number of cases a displacement of some sort exists, and this is usually found to be in relation to its normal level in the pelvis. And again, where the uterus is found to have deviated from the normal position downwards, it is most frequently found also to have deviated from its normal direction laterally. Uterine prolapse may be due to perinæal lacerations or merely perinæal relaxation; vaginal relaxation, a condition very frequently found in large, stout women of over thirty years of age; relaxation of the round, broad, utero-vesical and utero-sacral ligaments generally as a result of parturition; disappearance, in part or completely, of the fat lying between the layers of muscle; pelvic deformities; habitual overdistension of the bladder or rectum; finally, that relaxation of the abdominal walls found in multiparous women, which by causing displacement of neighbouring organs produces an abnormal downward pressure.

Careful and persevering electrical treatment in these cases will bring about a greater improvement than can be effected by any other known method of treatment.

Treatment.—The indications for treatment are, firstly, to bring about a reduction in the bulk of the organ, and, secondly, to develop the abdominal muscles, the abductors and adductors of the thighs, and the uterine ligaments. The faradic current derived from a short thick wire secondary coil should be employed, or, in cases where the general relaxation is excessive, that from a primary coil, with very slow interruption.

It is important to remember that a far better effect is produced by the faradic current on muscle when the interruptions are very slow, with short, frequent applications, than under any other conditions. The application of faradism derived from a long fine wire coil, with excessive frequency of interruption, will rapidly produce relaxation and denutrition of muscle and allied tissues by simple muscular fatigue. In all relaxed conditions the interruptions should not exceed 120 in the minute, and will be more effective if they are kept to from 40 to 60. The combination of the first three secondary coils to be used. The applications to any particular set of muscles should last about nine minutes, with an interval of rest of one minute after every three minutes. At first the application should be made by means of a bipolar uterine electrode; later on, a bipolar vaginal electrode may be substituted for it. If there is any considerable amount of tenderness present at the commencement of the treatment, it may be necessary to use fine wire

faradism with rapid interruptions, for one or two applications, in order to dull the sensibility of the parts. Faradism acts by improving the circulation, developing and toning the muscular fibres, and stimulating the uterine cells. If the uterus is much displaced, it is advisable to put it, as nearly as possible, in a normal position before commencing the sitting.

In all cases it is necessary to act on the vagina ;



FIG. 34.—VAGINAL ELECTRODE.

and where the bulk of the organ is not sensibly increased, the cataphoretic powers of the continuous current may be usefully employed. In these cases the vaginal electrode should be covered with lint soaked in a saturated solution of tannic acid in water to which a little glycerine has been added, and some of the solution should be injected into the vagina before inserting the electrode.

The muscles of the abdomen and thigh are best stimulated by electric massage, the combined currents being used, and the nurse's hand forming the positive electrode. The hand may be wet with salt and water with a little glycerine added. In any of these applications it is never necessary to use a stronger current than is quite tolerable to the patient. Where possible,

the sittings should be given daily, and every effort should be made to improve the patient's general health. For this purpose general faradization, or static electrification, with small sparks drawn through the clothing from all parts of the body and limbs, will be found of service.

A powerful action on the tissues composing the vaginal walls may be induced by using a metal speculum as the negative pole, and placing two knobs as the positives over the openings of the inguinal canals.

If it is desired to act specially on the round ligaments, an intra-uterine electrode should be used as the plus pole, and two moist plugs on either side of the os uteri as the minus.

CHAPTER XIII.

UTERINE DISPLACEMENTS.

IN uterine displacements all treatment must be directed towards developing the muscular fibres of the uterus and the ligaments in such a manner that the tendency of the organ to assume an abnormal position may be overcome. It is also necessary that every care should be taken to prevent it being continually pushed out of its proper position by an overdistended bladder or an overloaded bowel. Many of the affections of the genital organs of women have their starting-point from one of these causes. Women,

through feelings of false modesty, constantly disregard the natural promptings to evacuate the bowels or bladder, and by the force of evil habit produce that constipation which is often one of the most troublesome symptoms to treat in a gynæcological case. The continual forcing of the uterus out of its proper position weakens the normal tone of muscles and ligaments and lays the foundation for a displacement of some kind.

General Treatment.—Where the uterus is bound by adhesions or inflammatory products in its false position, the treatment in the first place must be directed towards removing and causing absorption of these, and then, by means of what may be called uterine gymnastics, strengthening the muscles and ligaments which have become flaccid and lost their tone. From a considerable personal experience, I have no hesitation in saying that by far the larger number of displacements which are now considered incurable would yield to a careful and persevering electrical treatment.

Faradism is, *par excellence*, the form of electricity to use for the development of uterine muscle. In all cases where possible the combination of the first three secondaries should be used, and the interruptions extremely slow. The strength of the current is not so important here, but it should never be sufficiently strong to be really uncomfortable to the patient. Whether the electrode should be extra or intra uterine

must be left to the judgment of the operator, and will necessarily depend on the individual peculiarities of the case.

I have myself found that in the earlier stages of the treatment better results are obtained by the use of the vaginal unipolar electrode, the indifferent consisting of one placed over the sacrum and another over the bladder. Both these should be well moistened with a solution of salt in water. When there is distinct development of muscle, treatment may be carried on by means of the bipolar intra-uterine sound.

In the case of adhesions being present, these should be treated with a view to their dissolution, as recommended under 'Pelvic Exudations and Adhesions.' In all cases where it is possible to do so, the uterus should be placed in its normal position before the commencement of each sitting. A curious result of this treatment is, that the muscle which is abnormal in quantity or quality develops far more rapidly than that which is normal. In using the rectal or vesical electrodes—faradic—it is important that the sitting should not last more than three minutes after contractions have been once established, in order that the muscles may not be fatigued. The contractions make their presence felt by crampy pains.

CHAPTER XIV.

ANTEFLEXIONS AND ANTEVERSIONS.

THE most usual causes are :

1. Inflammatory changes in the walls of the uterus.
2. Contraction of the utero-sacral ligaments as a sequence of inflammation.
3. Adhesions in the pouch of Douglas.
4. Excessive pressure from above, either from the surrounding organs or from new growths.

Of the above causes, Nos. 1 and 2 are usually associated.

These cases usually apply for treatment on account of the dysmenorrhœa, which is the most prominent symptom, together with sterility.

Treatment.—All treatment must be carried out with a view to promote absorption of the inflammatory exudations and the loosening of adhesions in the first place.

The manner of doing this has already been fully entered into, but in order to effect a complete cure more than this is necessary in a large majority of the cases which come under our notice.

First of all, the uterus must be restored to its natural position, as, unless this is done, it is impossible to cure the endometritis which is so frequently present.

There can be no doubt that the use of the stem pessary in many cases does relieve the symptoms and brings about a cure of the inflammation, and patients previously sterile have conceived after its use; but in spite of every precaution there is a distinct danger in this form of treatment.

They are at all times very apt to excite inflammation, sometimes of a serious character, and they are of course absolutely inadmissible where any pelvic inflammation already exists.

I have found it possible to entirely dispense with their use. By a judicious use of electricity, the stem



FIG. 35.—PLATINUM SOUND, WITH ADJUSTABLE SHEATH.

pessary, at any stage of the treatment, becomes unnecessary, and the results obtained are certainly not inferior to those obtained by the older methods.

When the adhesions have been dissolved away and the uterus is fairly mobile, the positive pole should be introduced, and the indifferent electrode, about 8 by 6 inches, placed on the abdomen. The current strength for the first six or eight sittings should be from 50 to 100 milliampères, and the length of the sitting from six to eight minutes, if the patient can comfortably bear it. This application is for the purpose of cauterizing the endometrium. Where there is much endometritis present, the

cauterization can be done more rapidly, and perhaps more completely, by utilizing the cataphoretic action of the current and dressing the sound with cotton-wool soaked in pure carbolic acid. In milder cases a copper sound may be used as the plus electrode, the salts resulting from the electrolytic action having a very useful cauterant and astringent effect. Later on the current strength should not exceed 20 milli-ampères, the length of the sitting being from fifteen minutes to half an hour. At the commencement of each sitting coarse wire faradism should be used for about five minutes, the electrodes being similarly placed as for the continuous current.

Symptomatic recovery is the rule.

During the treatment, which will consist of about twenty-five sittings, one being given every second day, the patient must be carefully warned to refrain from sexual intercourse: for should there be an interval in the treatment, conception is very apt to occur, and the subsequent application of the current might be attended by the most serious consequences.

CHAPTER XV.

RETROFLEXION.

THE cases most suited for electrical treatment are those in which there is marked atrophy of the posterior wall of the uterus, and those due to a relaxed condition of the utero-sacral ligaments or the round ligaments. The first not only acts as a cause of retroflexion, but is itself brought about as a result of the false position of the organ.

Another, but a rare, cause of retroflexion may be mentioned. When the utero-vesical ligaments are contracted as a result of inflammation, the isthmus is dragged forwards and somewhat upwards, while the fundus is left comparatively free and is exceedingly apt to be dragged backward by the distensible organs in its vicinity.

In this abnormality it is evident that the treatment must be adapted to the continuing cause. Where adhesions, or a ligament shortened by chronic inflammation, bind the organ in a false position, the continuous current, with the negative pole either in the vagina or uterus, as recommended in the treatment given for 'Pelvic Adhesions,' should be used until the adhesions are broken down, the inflammatory thickening of the ligaments dissipated and the normal mobility of the organ restored.

Where there is reason to believe that the atrophy

of the posterior wall was antecedent to the flexion, every effort should be made to restore 'tone' to the system.

The intra-uterine positive pole, with a current strength of from 15 to 20 milliampères, may be applied for about twenty minutes three times weekly. The indifferent electrode, about 6 inches square, can be placed on the abdomen. The combined current should be used, the faradism being derived from a short coarse wire primary coil, or combination of first three secondaries in the special coil, with very slow interruptions. Central galvanization and faradization should also be used.

Before the commencement of each sitting the uterus should be placed in its correct position.

As the case improves, a bipolar faradic intra-uterine pole may be used, and the current given as strong as can be tolerated by the patient. The secondary current from a coarse wire coil should be used, and the interruptions slow. Each sitting may last from twenty to thirty minutes, and should be alternated with the use of a sound in the uterus as one electrode, and a moistened pad on the sacrum as the other, the same coil and current being used.

The prognosis is good. If sufficient patience is exercised, the results are very satisfactory in a large majority of the cases: a symptomatic cure with a sense of pelvic well-being results in practically every case. This is no doubt due to the fact that a patient's

distress and bad symptoms generally are caused by the inflammation and adhesions present, rather than by the actual displacement; and thus relief under suitable electric treatment is the routine result.

In the cases I have had an opportunity to submit to treatment, I have never found it necessary to resort to the use of a pessary.

CHAPTER XVI.

STENOSIS OF THE CERVICAL CANAL.

THE treatment of this condition by electricity possesses many advantages. No anæsthetic is necessary, and while mechanical dilatation has in most cases to be repeated at intervals, on account of the recurrence of the pain, electrical dilatation usually gives permanent results. Again, the treatment is practically painless, and does not involve any interference with the patient's daily occupations and duties.

Treatment.—The negative pole should be a platinum sound passed up the cervical canal. It should have an insulating shield, which must be pushed up to the os and fixed there. The indifferent electrode should be a large abdominal pad. Sittings may be every second day, and a current of from 50 to 80 milliamperes used for five minutes each sitting. The

time, however, should be estimated from the moment when the current has attained its maximum strength.

From seven to twelve sittings will be required.

If there is much endocervicitis present, and the passage of the sound and a negative current gives much pain, it is best to begin the treatment by using the anode in the canal with a tolerable current strength. Generally after two or three applications the full strength of the cathodal current can be borne.

Care must be taken that the point of the sound only just passes beyond the os internum.

No special precaution as to exercise is necessary, unless the application is made a day or two before the menstrual period. When this is the case, rest is necessary.

CHAPTER XVII.

OVARITIS.

THIS is an affection which is present, in a mild degree, much more frequently than is generally supposed. In its more severe forms it is usually associated with endometritis and tubal mischief.

The primary indications for treatment are to relieve pain and to bring about muscular relaxation.

For this purpose a faradic current must be used. It is absolutely necessary that this current should be

supplied by a coil of very fine wire—say No. 36, B. W. G.—and that it should be a coil of at least 1,500 yards in length. The interruptions should be excessively frequent; in fact, within certain limits, the more rapid the interruptions the more relief will be obtained. The painful organs should be included between the electrodes, the minus being placed in the vagina and the plus externally over the ovaries.

When excessive tenderness has been removed, galvanism can be used with great advantage. The positive pole should be covered with cotton-wool moistened with a 10 per cent. solution of potassium iodide, and placed in the vagina so as to press gently against the ovary affected. The indifferent electrode should be large in size, and placed over the sacrum. For the first three or four sittings the current strength should not exceed 15 milliampères; subsequently it may be increased to 30, and then to 50; but if the latter strength is approached, the sittings should not last more than five minutes. This application may be used every second day, faradism, by means of the bipolar vaginal electrode, to be applied on the intervening days.

Cases will be found usually to improve rapidly under this treatment. In the slighter cases, faradism alone will frequently be found effectual in bringing about a cure.

CHAPTER XVIII.

ENDOSALPINGITIS.

THE symptoms of this affection possess a close resemblance to those associated with the actual presence of pus, and consequently the diagnosis presents considerable difficulty. One of the most characteristic symptoms is the occurrence of a glairy discharge, like white of egg; but, as in most cases endometritis is also present, the characteristic appearance of the discharge is frequently masked.

The first and most important indication for treatment is the relief of pain, and this is better done by the continued use of bipolar faradism than by any other means.

It is generally found that when the disease is on the left side the pain complained of is more continuous and more severe than when it is the right tube which is affected. This peculiarity has been attributed to the proximity of the tube to the rectum and to the greater blood-supply. Treatment should, if possible, be commenced in the acute stage. The faradic current should be applied by means of the bipolar vaginal electrode, the four secondaries combined if special coil is used. If this application is properly made, it will be found of great service in relieving the pain, which is generally most persistent and severe. Each application will give relief for about

four to eight hours. The points to be observed in the application are, firstly, that the current should be derived from a long fine wire coil; secondly, that the interruptions should be extremely rapid and *smooth*; and, thirdly, that the attainment of maximum intensity is very gradual (Goelet).

The strength of the current used should be entirely regulated by the feeling of the patient. It should be barely perceptible, and should never be productive of any unpleasant sensations. It may be increased and continued until a marked feeling of relief is experienced by the patient.

This result is usually attainable in about twenty minutes. The application may be repeated twice daily. The regulation of current is best effected by the use of a rheostat in the battery circuit.

Galvanism is, as a rule, distinctly contra-indicated in the acute stages of this affection, but there are cases in which it is found that it gives greater ease than faradism. The positive pole, consisting of a carbon ball electrode covered with moist absorbent cotton-wool, may be placed in the vagina, and a current of from 20 to 30 milliampères used.

The peculiar dragging and colicky pains due to perimetritis and compression of nerve fibres, so characteristic of the disease, are effectually relieved by one or other of the applications.

In the subacute stages the same methods of bipolar faradism may be used at first, with an occasional

application of galvanism. When it is found that the faradic applications cease to afford the same amount of relief, use a more stimulating current—that is, a current from a shorter and coarser wire coil. Great care must be taken that the current used is not too stimulating, or there would be danger of bringing about exacerbations of the disease.

The galvanic applications should be used for about ten minutes every second day, or even every third day, according to the severity of the symptoms and the amount of tolerance for the current. The current strength should never exceed 30 milliampères, and the positive electrode should be a carbon ball covered with absorbent cotton-wool, and dipped in glycerine before being placed in the vagina.

It is important to remember that, in applications for the relief of pain, it is absolutely necessary that the rectum should be empty. If this is not attended to, the anæsthetic effect will either be very slight and temporary or else entirely absent.

Intra-uterine applications in this condition cannot, as a rule, be carried out, on account of the exceedingly sensitive state of the endometrium. When all tenderness on pressure is removed, the minus electrode may be used in the vagina. To commence with, a current strength of about 20 milliampères—of course, turned on gradually—should be used at each sitting, and towards the end of the sitting be increased to 50 milliampères. The object of this is to promote resolu-

tion of hyperplastic inflammatory exudation, to increase and intensify absorption, and to loosen adhesions. As bipolar faradism has a marked effect in stimulating and increasing capillary circulation, it will be found a very effective adjunct to the above. As the case gradually passes into a chronic stage, the faradic current employed should be derived from a shorter coil and of thicker wire, so as to produce a more stimulating effect.

If the discharge is very slight and it is thought advisable to increase it, a minus electrode, somewhat conical in form, may be inserted in the canal, and a current of about 10 milliampères passed for a few minutes two or three times; this will quickly enlarge the passage, and permit of any retained discharge escaping. When there is reason to believe that the discharge is retained in the tubes through a tumefaction of the uterine orifices, an ordinary sound, insulated to within about two inches of its extremity, may be passed into the uterus. This should be used as the minus electrode; and with a moderate current two or three applications will usually remove the tumefaction and bring about the flow of the discharge.

In choosing the strength of any particular application in these cases the golden rule must be, never to use a current which gives a pain lasting for **more than a few seconds.**

CHAPTER XIX.

SUPPURATIVE SALPINGITIS.

THE usual symptoms of this condition are :

Burning and dragging pains.

Premenstrual dysmenorrhœa.

Purulent discharge.

Tenderness over the tubes and ovaries.

Enlargement of the tubes.

The indications for treatment are, firstly, to promote the free drainage of the tubes by using the minus pole in the vagina, or even in the uterus if the vaginal application is not effective in bringing about a discharge. In both cases bipolar faradism may be used with advantage.

The continuous current used should not exceed 10 milliampères to begin with, gradually increased in the course of several sittings to 30 and 50 milliampères. The applications of the milder current may be made every day ; when, however, 30 or more milliampères are employed, they should not be administered oftener than every three days.

It may be taken as a fixed rule, that when pus is present the positive electrode must never be used internally.

The action of the cathode in liquefying the pus greatly assists its discharge.

The second indication for treatment is to cauterize

the endometrium in order to remove the diseased tissue, at the same time securing depletion by a thorough drainage of the uterus and tubes.

Where the parts are matted together by inflammatory exudation, it will be necessary to break down the adhesions by the use of the minus pole internally, either in the vagina or in the uterus, according to the special circumstances of each case.

The contra-indications to this treatment are nausea, a continuous sharp pain in the hypogastrium, with marked digestive disturbances and a general aggravation of the symptoms. These symptoms may generally be taken as pointing to a serious obstruction at the uterine end of the tube, preventing the evacuation of the pus. Where this is the case, a resort to surgery usually becomes necessary.

If the tube can be distinctly felt bulging, the pus may be drawn off by using a platinum or gold-plated cannula insulated to within a short distance of its extremity. When the pus is very thick and will not readily flow, if the cannula is used as the negative pole with a current of about 30 milliampères for a few moments, the pus will be liquefied and will flow readily. When this has taken place, and before withdrawing the cannula, turn off the current and reverse the poles, so that the cannula will now form the positive, and gradually turn on the current, until the galvanometer shows that about 50 milliampères are passing. This current should be allowed to pass for ten minutes. The im-

mediate effect is the liberation of chlorine and oxygen, which has important curative and antiseptic effects.

Where drainage is desired, it is sufficient to not allow the insulated portion of the cannula to enter the wound at all. If this is done, the cannula must be used as the negative pole for two or three minutes before withdrawing it, or considerable difficulty may be found in removing it. The cauterant effects of the current will provide against septic absorption. Gautier recommends that the cavity be filled with a solution of iodide of potassium, and the liberation of the iodine in the cavity be brought about by the application of the positive pole of platinum or carbon.

It should be remembered that the positive pole promotes healing, while the negative pole loosens adhesions and hastens the absorption of deposits.

CHAPTER XX.

HYDROSALPINX.

THE dilated tube is usually found in the pouch of Douglas.

Puncture with a trocar, evacuate the fluid through a gold-plated cannula insulated to within a short distance of its extremity. Let this cannula be the negative pole, and pass a current of from 20 to 40 milli-

ampères for five minutes before withdrawing the cannula.

The operation should be performed at the patient's own home, and the strictest antiseptic precautions used. An anæsthetic is necessary. After the removal of the cannula, an iodoform gauze tampon should be introduced, and replaced by a fresh one in five hours' time.

It is advisable to use three or four applications of the positive pole subsequently, in order to promote rapid contraction of the dilated tube. In these applications the positive pole should be a carbon ball covered with absorbent cotton-wool moistened with glycerine and water.

CHAPTER XXI.

HÆMATOSALPINX.

TREATMENT of this affection should be directed towards bringing about absorption of the effused blood. This can be best effected by applying the positive pole, consisting of a cotton-covered carbon ball in the vagina, and the negative low down over the abdomen, including the mass between the poles. Goelet and Gautier recommend that a current of from 40 to 50 milliampères should be used for ten minutes every second day. I have, however, found in my own experience that better results can be obtained by

using currents not exceeding 15 milliampères for half an hour every second day.

Absorption seems to proceed rapidly, and the astringent effect of the positive pole acts towards preventing further hæmorrhage.

CHAPTER XXII.

EXTRA-UTERINE PREGNANCY.

In spite of the violent opposition that the proposal to use electricity to procure the death of the fœtus in these cases has met with, a mass of absolutely unimpeachable evidence in favour of the proceeding has grown up. If the treatment is conducted in a proper manner, it is practically devoid of danger, can be used as soon as the condition is diagnosed, and, if unsuccessful, does not in any way preclude the subsequent laparotomy.

It must be evident that, no matter how skilfully laparotomy is performed, nor how experienced the operator, there will always remain a considerable element of danger. Therefore it is a question whether it is not wholly unjustifiable to subject a patient to this danger without giving her what is, at least, a fair chance of cure by safer means first.

A great deal has been written and said about the danger of rupturing the sac by the use of the current. I am not aware of any such case having ever occurred, and, if proper precautions are observed in the applica-

tion, I see no reason why such an accident should be feared.

Treatment.—As soon as the diagnosis is made, electric treatment should be commenced. A metal ball electrode should be covered with absorbent cotton-wool moistened with a saline solution; this should be placed in the vagina, resting against the tumour, and connected with the positive pole preferably. A warm, well-moistened sponge, placed on the abdomen in such a manner that the tumour may be between the two, will form the negative pole. The current should be turned on slowly until the galvanometer shows that about 70 milliampères are passing, or more if it is found that the patient can bear it, and this amount allowed to pass for about five minutes. It should then be slowly diminished until only 20 milliampères are passing, and the current made and broken rapidly about a dozen times. This is best done by tapping the metal portion of the external electrode with the wire coming from the minus of the battery.

The treatment should be carried out at the patient's house, and, as the shocks are strong enough to be very disagreeable, an anæsthetic may be administered with nervous patients.

The patient should rest in the recumbent position for some hours afterwards. The sittings may be repeated twice a week until cessation of the growth shows that death of the fœtus has taken place.

When it is certain that the object of the sittings

has been accomplished, galvanism may be given daily to promote disintegration and absorption of the tumour.

In order to do this, the minus sound should be used in the uterus, or a lint-covered ball electrode in the vagina, and a large moist pad connected with the positive pole placed on the abdomen over the tumour. A current strength of about 15 milliampères may be used, and the sittings should last about half an hour, if given every second day, or one-half that time if given daily.

CHAPTER XXIII.

FIBROID TUMOURS OF THE UTERUS.

THE great attention which has been given in recent years to the use of electricity in the disorders of the pelvic organs in women is undoubtedly due to the careful researches of Apostoli and the startling results he obtained by use of strong currents in the treatment of fibroid tumours of the uterus. The publication of these results in 1886 at once arrested the attention of the medical world, and led to a host of workers, many of them totally unfitted by their absolute ignorance of the first principles of electric applications and destitute of that manipulative skill necessary to make such applications successfully, attempting to repeat his experiments. As might be expected, the results

obtained were not at all satisfactory, and the attempt to use the strong currents advised by Apostoli without a sufficient knowledge of the details of the application in some cases led to disastrous results, while in others no apparent effect of a curative character was produced. The apparatus used by some of those who afterwards condemned the system as useless was of such a character that it would have been impossible for it to have produced the necessary amount of current at all; while others, having by proper applications brought about a **symptomatic** cure, but failed to cause the actual tumour to completely disappear, emptied all the vials of their wrath upon Apostoli for having promised something for his treatment which it did not do.

Apostoli, it should be remembered, never claimed that all or even the great majority of fibroid tumours would disappear entirely under his treatment. What he did claim was that a certain proportion of tumours would disappear, that a far larger proportion would diminish in size, that all distressing symptoms would cease, and that the great majority of the fibroid tumours treated by his method would cease to be troublesome whether they were appreciably diminished in size or not—in fact, that a symptomatic cure would result. In spite of a great amount of bitter hostility shown towards this method, time has proved that the claims originally made for it, though perhaps not fulfilled to the letter, have been to a large extent

justified by results, and the system now has an important place in gynæcological therapeutics.

The three symptoms which make the presence of a fibroid tumour unpleasant or dangerous are: firstly, those due to pressure on surrounding organs; secondly, the hæmorrhage, which is frequently of a dangerous character and always exhausting; and thirdly, the pain which is occasionally present. So long as these symptoms are removed the tumour is no longer a danger, and hardly an inconvenience to the subject, and I have no hesitation in saying that in a large proportion—indeed, I may say the larger proportion—of cases treated by Apostoli's method these symptoms disappear. How this relief is brought about is to a certain extent a matter of conjecture, but no doubt the electrolytic action of the sound upon the endometrium, and the contractile effects of the continuous current, play a large part. The powerful uterine contractions produced may, by interfering with the circulation in the tumour, bring about a shrinkage.

Contra-indications.—Where there is any pus in the tubes, or where there are extensive peritoneal adhesions to the tumour, electrical treatment should not be commenced. It is never satisfactory, and may be dangerous.

Tumours of a gelatinous or fibro-cystic character are never benefited, and it is a mistake to attempt to treat them in this manner—that is, by Apostoli's method of electrical applications.

It is never advisable to commence the treatment of a tumour unless it gives rise to symptoms of sufficient importance to justify treatment. The form of fibroid which experience has shown to be most susceptible to benefit by treatment is the one containing a large proportion of muscular tissue.

Treatment.—Continuous current must be used. The strength should be over 100 milliampères, but not exceed 150. Apostoli recommended much stronger currents, but most workers are now agreed that no special benefit accrues from their use, while the inconvenience and the danger to the patient are much greater.

I consider the positive pole in the form of a platinum sound should be used internally, while the negative will consist of a large abdominal pad, as before described, suitable for the passage of such large currents. The greatest care must be used in turning on the current slowly, and in avoiding any interruption in the circuit when the full current is passing, as the resulting shock might be very serious. For the first two or three sittings the full current should not be used, in order to give the patient time to get accustomed to the current.

Every care should be taken that the parts and the sound used are in a thoroughly aseptic condition, and the patient should have a douche of a solution of carbolic or salicylic acid before the sitting. The water should be as hot as can be comfortably borne,

which will be found to be about 115° F. Any roughness or want of skill in passing the sound may make the use of the strong currents impossible by exciting intolerance. Careful attention must be given to the constitutional state during the whole period of treatment, and it is especially necessary to guard against constipation. I have known constipation existing even for a single day be productive of unpleasant results while administering the treatment.

It is best to refrain from using electricity during the periods, or even during the presence of that sanguineous discharge which frequently precedes menstruation in patients undergoing this treatment. The patient at these times may be directed to use a hot antiseptic douche daily. If, however, the period shows signs of being excessive in quantity, the applications may be again commenced after three or four days, and they will be found to at once lessen the discharge.

As a rule, twenty-five applications will be required in any case. After this number have been administered all treatment should be stopped for a couple of months, as it will often be found that considerable improvement continues to take place when the administrations of the current have been abandoned.

Wherever strong currents are used internally, it is imperative that the patient should rest immediately after the application for at least half an hour; and if the applications are not made at her house, she

should, on returning home, rest during the remainder of the day in a horizontal position. Neglect of this precaution has over and over again been productive of unpleasant results.

I have generally found it expedient to use the combined current in these sittings, and I think that improvement is quicker brought about by doing so. Certainly it is more effective in relieving pain.

Where there is much intolerance, the induced current may be switched on first, using the current from the four combined secondaries of the coil described, and the most rapid interruptions which the apparatus admits of. After a few minutes an anæsthetic condition of the parts will be brought about, and the continuous current can be slowly turned on to the required strength without causing a serious inconvenience to the patient. The induced current from the first two secondaries combined, with moderately slow interruptions, should be **very gradually** turned on. In no case must a strength of current be used which is absolutely painful to the patient, and it is of the greatest importance that the first induced current is completely turned off before attempting to switch on the second, or a most violent and painful shock may result. Where the pain felt is due to impaction of the tumour, a few applications of a milder continuous current will be found to loosen it, and so relieve the pain.

The above method, though a slower one than

electro-puncture, should invariably be used and given a fair trial first where this is possible ; but there are cases where the position of the tumour is such that it is an extremely difficult, if not impossible, matter to pass the sound. In such cases it is necessary to resort to electro-puncture.

There can be no question of the benefit of this proceeding in suitable cases, and if proper precautions are used, the increase of danger is very slight indeed. The original suggestion of Apostoli, that a bare steel needle, without any insulation, should be pushed into the tumour, is one which seems to me to needlessly increase the risk without any corresponding benefit. The result of this is the formation of a sinus in the tumour, which, communicating with the vagina, opens the way to septic infection. Where the needle is thoroughly insulated and pushed in well beyond the commencement of the insulation, the aperture of entrance closes rapidly. To a large extent, the particular pole which is used internally must depend upon the special features of the case. Apostoli recommends the negative, but undoubtedly the hæmstatic and anticongestive qualities of the positive are strong arguments in its favour. Where the needle forms the positive pole, it is necessary that it should be of either gold or platinum, and if there is any difficulty in withdrawing it, the poles may have to be reversed for a few seconds in order to loosen it. Full particulars are found in another part of this work of

the details of the application. I would again, however, speak of the great importance of exercising the most rigid precautions to ensure strict asepsis.

The douche used previous to the operation should be sufficiently copious and sufficiently strong in carbolic acid to remove every trace of discharge. Though the operation may be performed in the consulting-room, the patient should on her return at once go to bed, and remain there until the next morning. A hot mild antiseptic douche should be used morning and night afterwards, and the puncture should not be repeated for a week or ten days.

The currents used may be somewhat stronger than in the intra-uterine sittings, as much as 250 milli-ampères being of service.

The favourable results of galvano-puncture manifest themselves far more quickly than when the intra-uterine pole is used.

The number of applications varies according to the effect produced. In the average case from five to ten are necessary.

CHAPTER XXIV.

CATAPHORESIS.

THE process is not in any sense an electrolytic one, as it is confined to the positive pole, whereas electrolytic action takes place at both poles. This process, I think, may be taken to explain why galvanism is such a powerful aid to nutrition. There can be no doubt that the constant circulation of protoplasmic molecules and the essential liquids from one cell to another by virtue of this process, and the enforced diffusion of liquids into capillary vessels, promotes a rapid interchange which is ever tending to the removal of the diseased cells and products, and their replacement by those more nearly approaching the normal.

The cataphoric power of the positive pole of the continuous current is one which may be utilized with considerable advantage in the treatment of affections of the pelvic organs. In using drugs in solution, which I have found to be far the most convenient way, the rule is that the total amount of liquid driven through the skin or mucous membranes is directly proportional to the total quantity of current used, whether this is applied by means of a small or large electrode; in other words, 1 ampère of current will drive in as much fluid in a given time with an electrode 1 inch square as it will with one 20 inches square. This rule is important to remember, and

shows how essential it is in applications of the continuous current for promoting general or local nutrition to use as many milliampères as can be tolerated by the patient.

In using this property of the current for the introduction of any drug into the system through the skin



FIG. 36.—DIFFUSION ELECTRODE.

or mucous membrane, the cathode should be so arranged as to be as far as possible in a line with the anode. Where the liquid has to be driven through the skin, from 5 to 15 milliampères of current should be used. The drug which it is desired to introduce, if a liquid, may be poured on to the positive electrode,



FIG. 37.—MORTON'S ELECTRODE FOR CATAPHORESIS.

which should be of a suitable size and covered with lint or absorbent cotton-wool. If the drug is in solid form, the dose which is to be administered should be dissolved in water and then poured on the electrode. The amount of liquid used must be sufficient to thoroughly moisten the electrode covering.

Small discs of absorbent paper, impregnated with definite quantities of certain drugs, can be obtained. These require to be moistened with water, placed on the part, and a suitable electrode pressed firmly on them while the current is passing.

This method of administering drugs has certain advantages: the avoidance of digestive troubles, the directive influence of the current enabling the drug to be brought in contact primarily with any particular part, and, thirdly, the possibility of obtaining the local or general action of any medicament



FIG. 38.—MEISSNER'S ELECTRODE FOR CATAPHORESIS.

without the interference of the various digestive juices with which it would be brought in contact during the process of absorption, were it administered in the ordinary way.

Meissner, who has devoted considerable time to studying this subject, considers that the electrodes should be placed as close as possible together, and the current should be reversed every five minutes, in order that the drying effect of the positive pole may not prevent the diffusion of the liquid employed. He uses a cylinder of ebonite divided into two parts

by an ebonite partition. The cylinder is closed at one end, the wire from the positive and negative pole passing through into the cavities. In these cavities sponges moistened with the fluid employed are placed.

THE END.

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