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from the writer.
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GALVANISM,

APPLIED TO THE TREATMENT OF

UTERINE HÆMORRHAGE,

BY THOMAS RADFORD, M.D.,



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MANCHESTER AND SALFORD LYING-IN HOSPITAL, &c., &c.

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APPLIED TO THE TREATMENT OF

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GALVANISM,

APPLIED TO THE TREATMENT OF

UTERINE HÆMORRHAGE.

A LECTURE DELIVERED TO THE MEDICAL PROFESSION AT THE MANCHESTER AND SALFORD LYING-IN HOSPITAL, ON THE 10TH OF DECEMBER, 1844.

BY THOS. RADFORD, MD.,

CONSULTING PHYSICIAN TO THE HOSPITAL.

GENTLEMEN,—Of all the accidents which occur in obstetric science, there are none which are more important and more serious than uterine hæmorrhage, and none which require on the part of the practitioner, more promptitude and decision.

Uterine hæmorrhage is usually divided into that which takes place in the early months, and that which takes place in the latter months of gestation. The latter class is again subdivided into what are called accidental hæmorrhages, unavoidable hæmorrhages, and the after hæmorrhages. Accidental hæmorrhages are those which arise from accidental causes; unavoidable hæmorrhages are those which arise from a particular location of the placenta in the immediate neighbourhood of the os uteri; and the after hæmorrhages are those which take place after the delivery of the child, and they may occur either before or after the expulsion of the placenta. You will be also aware that there are a number of other uterine hæmorrhages which are unconnected with gravidity; but it is my object in this evening's lecture more particularly to dwell upon those discharges of blood which are connected with pregnancy in the latter months, and with labour. It is not my intention on the present occasion to enter into a full consideration of the subject, but more particularly to confine my remarks to that condition which is the result of profuse and long-continued bleeding, viz., exhaustion, a state highly interesting to the obstetrician, and which seems to me to require more than the recognized means for its management.

Now, we know that exhaustion may arise in all the varieties of hæmorrhage; but we find that it is more especially produced by those impetuous and large discharges of blood which take place before, during, and after labour.

With regard to those cases of flooding, before and during labour, which have proceeded to a state of exhaustion, it has been the custom of many obstetrical writers to recommend the practice of delivery. Others have discountenanced delivery in this particular condition; and of course, where the

principles of practice are unsettled in a case so important, it is very desirable that we should endeavour to discover some new method of treatment which shall place the question beyond dispute. Although such high authorities as Burns and Hamilton advocate delivery in these cases, it has always been my practice to recommend non-delivery; and if we were to analyze the cases that have been published in the reports of hospital and private practice, and those that have accidentally come to our knowledge, we should be startled at the immense loss of life arising from these extreme cases of hæmorrhage, where delivery has been adopted.

Now, I regret to say, I believe that the great ruling influence upon the mind of practitioners, in determining them to deliver at all hazards in these cases, is the dread of popular opinion. It is usually stated that no woman ought to die undelivered; and wherever a woman does die undelivered, it produces a very considerable sensation, both in the neighbourhood and in the mind of every party who may come to a knowledge of the circumstances. On this account a practitioner dreads the procrastination of delivery, lest death should occur before it can be accomplished, and his character be consequently involved in censure. Now, it appears to me, that when a practitioner is thus placed, he ought to possess sufficient moral courage to resist the pressure of popular opinion, and be guided by a higher principle in the discharge of his duty; and I am convinced that if the matter is fairly and dispassionately considered, it will be found that there is a great advantage in not delivering in these cases of exhaustion.

And first, with regard to the child, it is stated by the advocates for delivery, that there is the greater probability of its being saved by the immediate adoption of this operation, than by its delay. But if you will take the pains to investigate the reports that have been published, as well as to examine into the results of the practice of private individuals, it will be found that the child is nearly always dead in these extreme cases. Therefore this consideration ought not to have much weight

with us in deciding upon the principle of practice. And if you will reflect upon the causes which give rise to hæmorrhage, more especially in placenta prævia, you will find sufficient reasons for understanding why the child should be generally dead. In the accidental species of hæmorrhage, if the cause has been such as not only to lead to a separation of the placenta, but to something like a disruption or a wounded state of that organ, the death of the child is nearly inevitable; and in the unavoidable species, from the particular location of the placenta, if you recollect what must be the influence of labour upon the placenta itself, not only in producing detachment and a separation of its connection with the sides of the os uteri, but also the mechanical influence applied by the child's head coming upon it, you must see that in this case there is generally more or less of a disruption and breaking up of its structure; and consequently the child dies from bleeding from its own particular system.

If we go into enquiries as to the influence of the death of the child upon the hæmorrhage, we must look upon it as being rather an advantage to the mother, because it takes off a certain demand upon her blood, or lessens what Hunter calls "the stimulus of necessity," and therefore makes such a change in the balance of her circulation, as would be a means of checking, rather than increasing, the discharge.

We will now proceed to consider the question as regards the life of the mother; and when we are contemplating a subject of this kind, a woman placed under extreme circumstances of inanition or exhaustion, we ought not to ask, "Ought a woman to be delivered?" but, "*Can* a woman be delivered *safely*." That is the question we ought to endeavour to settle in our minds before we proceed to the operation. If we have a woman already in a state of exhaustion from large evacuations of blood, we must be certain that a plan of treatment which, in any way, produces an unfavourable change upon the nervous and circulatory systems, must add to the evils already existing. We have here sufficient prostration; and the mere emptying of the uterus will most inevitably increase it. Every surgeon is aware of the influence that is produced by the operation of tapping in cases of ascites in men, strong in comparison with some of these poor women, reduced as they are by the loss of so large a quantity of blood. Syncope, nay, even death, is sometimes the result of the abstraction of the ascitic fluid. We know, also, in some cases, and especially where there is a particularly exalted state of the nervous system, or some particular idiosyncrasy, that simple evacuation of the uterus, by the natural efforts, will produce death! This very change, then, has, in itself, a very unfavourable influence upon a woman thus prostrated. But, besides this, we must bear in mind that there must necessarily be a great demand upon their powers by the stimulus of forcible delivery.

There are a number of other circumstances which ought to be taken into account, as regards delivery. And one of the most important of these is the physical or structural impediment that may arise from a rigid os uteri. And when we come to the bedside of a patient, (I am sure every gentleman who has had much practical experience, will bear me out in this statement,) we shall find that some of those dogmas which are laid down in books are wholly untrue. I now refer particularly to that assertion of certain writers, who say, that by the evacuation of blood, the soft parts become so weakened and dilatable, that delivery can always be accomplished. This I most positively deny. And therefore I say that there are conditions of this kind which will be an obstacle to delivery.

The os uteri will continue *undilatable*, although the woman may be in such a state of exhaustion as to be literally tottering on the brink of the grave! It is true that this state of matters does not generally exist, but it is too frequent to be overlooked in determining our line of practice.

Again, you must be all aware, gentlemen, that hæmorrhages take place, and produce this state of exhaustion, before the woman has progressed to that period of pregnancy that would justify a practitioner in having recourse to forcible delivery; and this is a point not sufficiently dwelt upon by obstetrical writers. In proportion to the early occurrence of hæmorrhage, so will be the obstacles to delivery, as regards the introduction of the hand into the uterus. And when we are considering the chances of delivery, and taking into account the dilatable state of the cervix and os uteri, we should never forget the length of the former as regards the particular period of pregnancy. And not only is this to be taken into account, but there is another circumstance which must not be overlooked, viz., the degree of subsidence of the uterus into the pelvis; for according as the uterus remains high in the pelvis, so we may be certain that the difficulties of delivery will be proportionate.

In all uterine hæmorrhages, connected with pregnancy, there are certain attendant circumstances, viz., separation of the placenta, with or without disruption of its structure; exposure of the large orifices connected with the uterine sinuses, rupture of the decidual vessels and atony of the uterus, which is either primary or secondary. The natural means for suppressing the discharge are the formation of coagula, and the contraction of the uterus. As to the adhesion of the placenta, when once separated, or the cicatrization of this organ when disrupted, the practitioner can place no reliance on them in checking the flooding.

With respect to the coagulation of the blood, it may become influential in arresting slight discharges, but never ought to be depended upon in those profuse hæmorrhages which we are now more particularly considering. The coagula which form in the vagina, and which are stated to be so import-

ant in the suppression of the bleeding, may become, indirectly, an evil instead of an advantage, by deterring the practitioner from making a proper investigation of the case, under the idea that "the disturbance of these coagula is death." In my opinion, the coagula which are more particularly to be depended upon, are those in the immediate neighbourhood of the venous orifices that have been exposed, and I repeat that these are of no avail in the more serious cases; and therefore we must solely trust for the suppression of these large discharges of blood to that most important agent, contraction of the uterus.

The ordinary means of producing uterine contraction are so well known that I need merely refer to them before the present audience. We have the bandage, friction applied briskly over the uterus, grasping pressure, *secale cornutum*, the application of cold, and in the after hæmorrhages the introduction of the hand into the uterine cavity. But all these means may fail in producing this desirable change, and will fail and do fail in the extreme cases.

A fatal case having recently occurred in this town, which produced a considerable sensation at the time, where delivery was adopted, contrary to the principles which I had always publicly inculcated in my lectures, I was led to investigate the arguments of those who advocate that practice, more closely than I had perhaps ever before done; and it struck me that we were deficient in a means on which we might always depend for inducing uterine contraction, and so placing the woman in such a state of safety that the operation of delivery might be deferred. Whilst my mind was so much occupied upon this subject, I was consulted by my friend Dr. Goodwin, in a case of protracted labour, where the long forceps were required. The lady recovered well, with the exception of not being able to pass her urine. We administered all the usual remedies for a fortnight or more, using the catheter twice, sometimes three times a day, but without the least amendment. Upon Dr. Goodwin's suggestion, we decided upon the application of galvanism, which was undertaken by him, and the result was most gratifying, for the first application proved permanently successful. The decided efficacy of this plan in restoring the energy of the bladder, immediately led me to conclude that it was the very agent that I have already stated was a desideratum to ensure uterine contraction in cases of severe flooding, attended with exhaustion. We have here a woman reduced by loss of blood, with an atonic state of the uterus, either primary or as the result of the discharge. Now, as the advocates of delivery (*Vide* Burns and Hamilton) say that this proceeding gives the woman the only chance of living, because, so long as the uterus remains distended by its contents, and its parietes atonic, those large venous orifices which have been exposed by the separation of the placenta, are so situated that the chances of further effusion of blood exist, it occurred to me that the

application of galvanism would so effectually act upon the uterine tissue as to induce firm contraction of its fibres, and thereby at once lessen those large openings, and bring the walls of the uterus into firm apposition with the body of the child, so as to entirely close them. This great object having been attained, we might safely procrastinate the delivery, and adopt such means as would tend to raise the vital powers of our patient, such as the administration of opium, stimulants, and support; and the performance of the important operation of transfusion. With the uterus in this favourable condition, our restorative means, and particularly transfusion, would be far more likely to be attended with successful results than if the organ were distended and atonic; for in this case, the blood which is introduced into the system, either directly by transfusion, or indirectly by nourishment, produces no permanent benefit, because it is rapidly discharged again. Analogy further led me to believe that my conjectures would not prove unfounded, for galvanism is particularly impressive in its influence upon the muscles of recently killed animals, and we know how strictly allied in action, if not in structure, the uterus is to muscle.

I mentioned my views to a number of medical friends who generally much approved of them; and I was soon enabled practically to prove their correctness, by being called in consultation to a case of frightful internal hæmorrhage during labour, attended with extreme exhaustion, and where the os uteri was so rigid that the advocates of delivery could not possibly have carried their views into practice, without lacerating the os and cervix uteri. By this case I ascertained that galvanism produces an effective and powerful contraction of the uterus; and not only so, as regards its tonic contraction, but it has also the power of energetically exciting alternate contraction when applied at intervals. I can tell you most seriously and most solemnly, that it produces these two important changes upon the uterus in such a degree as in my previous reflections on the subject I had no conception of. The alternate contraction excited by this agent is analogous to, and as powerful as, that which is observed in normal labour, and the tonic contraction is greater. I shall not relate cases in detail, because it would occupy too much time; but I may state that I applied galvanism in a case where the membranes were unruptured, and the uterus in a state of great inertia, and alternate contraction was immediately produced. Before this the membranes were very flaccid; but as soon as the galvanic circle was completed, they became extremely tense and protruded low down into the vagina; and this state of tension did not subside when the alternate contraction ceased, as is observed in some degree in normal labour; for although the galvanic conductors were removed, so great a degree of tonic contraction of the uterus had been induced that this membranous bag could not collapse.

I am thus satisfied that by the application of this means, we can induce such a state of tonic contraction in the uterus, that, in these extreme cases of exhaustion from hæmorrhage, the woman may be placed in such a state of safety, that delivery may be postponed until a time arrives when it can be safely accomplished, and in the meantime we can have recourse to those measures which tend to raise the vital powers.

I think it probable that it may also produce one of the other natural means of suppressing hæmorrhage which I have already referred to, viz., coagulation of the blood; but this I have not yet positively ascertained by experiment, although I am led to conclude that such is the fact from some remarks made by Dr. Apjohn, in the article, Galvanism, in the *Cyclopædia of Practical Medicine*.

In my previous remarks, gentlemen, I must be understood to refer to those cases of hæmorrhage, where the placenta is not placed over or near the os uteri; but I shall now proceed to speak of those cases in which uterine contraction has a tendency to increase the discharge, cases which are usually described as belonging to the class, unavoidable hæmorrhage. In these cases, where the peculiar location of the placenta deprives us of the benefits that usually accrue from uterine contraction, and as it is the special influence of galvanism to produce this effect, it ought to be the object of the obstetrician so to modify his practice, as to place them within the range of this remedy. Before entering upon a description of the plan which I would recommend to be adopted in these cases, I shall first direct your attention to the practice of the older writers, and secondly refer to the mode in which nature sometimes terminates them when left to herself. In looking over the authorities from about 1612 to 1790, we find that they vary in their practice. Some recommend the removal of the placenta before the child; others advise the same course conditionally, that is, providing it is offering itself very largely or decidedly to the finger of the attendant; others again say that where it cannot be pushed back, it should be brought away before the child. It must be understood that many of these writers had not a correct knowledge of the true anatomical condition of parts in cases of placenta prævia, and I do not think it requisite to enumerate their names, as it would be occupying too much of your valuable time. You will find that in some of these cases, where the placenta was brought away before the child, according to the statement of these writers, the latter was even born alive, and in most of them the hæmorrhage was suppressed. And whilst on this subject, I may call your attention to a few cases of more recent occurrence, where this practice has been adopted. It happened to me in 1819 to have a case of placental presentation, where I detached the placenta, because it was hanging down so low into the vagina, that there was no chance of doing

anything else; the hæmorrhage was immediately suppressed, and the child expelled by the natural efforts. I am also indebted to my friend Mr. Jesse, who is present, for the details of a case in which he detached the placenta, and in which the hæmorrhage thereupon subsided. It was the practice of the late Mr. Kinder Wood, of this hospital, in many of these cases, to detach and bring away the placenta, and afterwards to leave them to the operation of nature, or to extract the child by the feet, as the case demanded. A case also occurred to Mr. Wilson, of this town, who kindly related the circumstances to me; the placenta had been rudely brought away by the attendant, and Mr. Wilson found the patient in a state of exhaustion, with the child still in utero. He extracted the child a considerable time after the removal of the placenta. It has occurred to me in my hospital practice, to find that the placenta had been brought down in mistake by the midwives in these cases, and this without causing an increase of the flooding.

Smellie mentions cases in which the placenta was brought away, and where the hæmorrhage subsided. In Dr. Collins' Reports of the Dublin Lying-in Hospital, there is a case in which the placenta was brought away by the midwife the evening before the admission of the patient into the hospital, and the hæmorrhage was thereby suppressed. Baudelocque relates a somewhat similar case. And now let us consider the method in which nature sometimes terminates labours where there exists placenta prævia; and for this purpose I have, without any great pains, collected 36 cases, illustrative of her powers, in separating and expelling the placenta before the child.

Giffard mentions one case; Perfect, one case; Smellie, four cases; Chapman, one case; Ramsbotham, sen., six cases; Merriman, one case; Hamilton, two cases; Collins, one case; Barlow, one case; Dr. Robert Lee, two cases; Gower, one case; Millington, one case; Bailey, one case; Wood, three cases; Lowe, one case; Hunt, one case; Wm. Lowe, three cases; Dorrington, two cases; and I have met with three cases of the same nature myself. Besides these, Mr. Jesse has related to me a case of placenta prævia where the entire ovum was expelled; Mr. James Kenworthy, a similar case; and the late Dr. Rigby has published a case also. Now, the bulk of these cases, gentlemen, have been detailed without any specific practical object, and consequently are more valuable to my present purpose than if they had occurred to myself, and had been brought forward to serve my own particular views. You may refer to many of them yourselves; and you will find in nearly all of them that the hæmorrhage was suppressed immediately after the placenta was thrown off.

These cases, then, and the practice already referred to, as adopted by the older writers, and several modern obstetricians, appear to me to furnish data of a most important character, where-

upon a practice, adapted to cases of exhaustion from unavoidable hæmorrhage, may be based, in order to bring them within the sphere of the application of galvanism. And before entering upon the description of my proposed plan of managing these cases, I beg to remind you that it is an established fact, that partial separation of the placenta, whether in simple or complicated retention of that organ after labour, or in placenta prævia, is attended with far more profuse bleeding than total separation.

In the earlier part of the lecture, I stated that one means of adding to the exhaustion already existing, is the evacuation of the uterus, whether that evacuation be partial or entire; therefore I consider that in these cases of placental presentation, it would be a decidedly important point of practice to draw off the liquor amnii *gradually*, as the first step in the management of the case. For this purpose I have somewhat modified Mr. Holmes' instrument for perforating the membranes, making the canula much larger, and having an oval aperture placed on each side near its open extremity. The entire instrument consists of a canula and trocar, which latter always lies concealed within the canula, by means of a spiral spring, except when pushed out by pressure on its button-like extremity. This trocar can be entirely withdrawn from the canula; so as to leave the latter free for the passage of fluid. Now I propose to pass this instrument through the placenta into the amniotic bag, and then remove the trocar, so that the liquor amnii may escape, a plan which I prefer to rupturing the membranes at the side of the placenta, because the water in the latter case would flow too rapidly, on account of the practitioner not being able to limit the size of the opening he might make; and also because by the plan now recommended, the integrity of the membranes being preserved, the placenta is thereby maintained in a better position for acting as a tampon against the open venous apertures when the head comes to press upon it.

In rupturing the membranes in the ordinary method, it is quite obvious that as the connection between the membranes and placenta is broken, the latter is liable to fall down more or less into the vagina. Having thus drawn off the liquor amnii, the next step will be to introduce the hand into the vagina, then to pass the fingers to the edge of the placenta, and carrying them on between it and the os uteri, to sweep the hand round its whole circumference, so as completely to detach the placental mass, care being taken to avoid rupturing the membranes. We have now brought the case into such a state as to be within the influence of galvanism; for although this practice of detaching the placenta may be a means of suppressing the bleeding, yet it will not restore the depressed powers of the woman; and on that account we still require an agent to induce such a degree of uterine contraction as will secure her from all chances of further hæmorrhage,

while we have recourse to such measures as will tend to support her strength.

In order, then, to ensure uterine contraction, we must have recourse to galvanism, and the subsequent management of the case must be conducted on ordinary principles, such as supporting the woman by stimulants, nutritious articles of diet, and transfusion. The delivery should be deferred until the powers of the patient are so far rallied as to justify its being undertaken, however long the interval may be; and that mode adopted which makes the least demand upon her constitutional powers. It may happen that a repetition of the galvanic shocks may, after a certain period, induce such uterine action as will expel the whole of the contents of the organ; and if this should not happen, it appears to me that it would be the best practice, to apply the long forceps, having previously removed the placenta, that is if the head presents. If any other part of the child presents, the case must be managed on ordinary principles.

The novelty of these views may produce an impression unfavourable to their proper estimation, but I hope, gentlemen, you will recollect that it has been my object to bring them before the profession in order that their correctness may be tested. I wish to benefit poor suffering women in their hour of danger, and to be candid in my communications to my professional brethren. In my own mind I am satisfied as to the influence of galvanism, and its power of producing uterine contraction. I am also convinced that it has no evil influence on the life of the child in utero, and after its birth that it is an important means of resuscitation in cases of asphyxia. Objections may be raised that we have not always the apparatus at hand. The answer to this objection is the same as that which refers to the application of all instrumental means. In my opinion, no gentleman who possesses the principles of a correct obstetrician, would carry his forceps, vectis, perforator, crotchet, or transfusion apparatus along with him. These things are to be sent for in emergencies only, and the same remark applies to the galvanic apparatus.

My remarks have hitherto been confined to the treatment of those cases of hæmorrhage that are attended with exhaustion before delivery, but there are other cases, to which galvanism is equally applicable. If we investigate the cases given by authors, we shall find that there are many cases of accidental hæmorrhage before delivery, where artificial rupture of the membranes has not succeeded in arresting the discharge, on which account several writers, Burns and Hamilton amongst them, advocate delivery in preference to this operation. Now, the artificial rupture of the membranes is recommended for adoption without reference to the condition of the os uteri; and it must be obvious, if this part is rigid and undilatable, and the flooding should continue, although the membranes have been ruptured, that it would be

highly hazardous to introduce the hand and to deliver by force. In such a case galvanism would place the woman in a state of security, by exciting the contraction of the uterus. I also consider that this power would be useful in some of the hæmorrhages of the early months of pregnancy.

With regard to the after hæmorrhages, especially those attended by exhaustion, I consider it particularly applicable where atony of the uterus is the principle feature of the accident. In those cases which occur previous to the expulsion of the placenta, it would be the duty of the practitioner to assure himself that this mass was not morbidly adherent to the sides of the uterus.

In hour-glass contraction, and other forms of irregular uterine action after labour, I anticipate great benefit from its use. In these cases there is a loss of balance between the contractile power of different parts of the uterine fibre, one part being in a state of atony, whilst the other is in a state of firm contraction. Now, if the galvanic current be directed in the longitudinal axis of the organ, it strikes me that you might excite the longitudinal fibres to contraction, and thereby restore the balance.

There are several other topics not directly connected with the subject of this evening's lecture which I shall slightly notice, in reference to galvanism. I am satisfied from positive trial of the remedy, that it will be found a most important agent in tedious labour, depending upon want of power in the uterus, and where no mechanical obstacle exists. I would also suggest the probability of its proving valuable in originating uterine action *de novo*, in cases where it may be considered necessary to induce premature labour. It seems to me also to be worthy of trial in certain cases of menorrhagia in the ungravid state, where, on vaginal examination, the uterus is found to be atonic, as evidenced by its large flaccid condition, and the patulous state of the os uteri.

Having made this digression, it is proper that I should remark, in reference to cases of hæmorrhage, that I am not urging this plan of treatment upon the profession, with the view of superseding the ordinary means; but rather with the view of supplying a remedy in those extreme cases where these have failed. I do unhesitatingly say that the obstetrician has the power in most cases to controul uterine hæmorrhage, so as to prevent them ever reaching this extreme state of exhaustion. But, nevertheless, we do meet with this condition, frequently in a large hospital practice, and also in private consultation practice. A number of cases have come to my knowledge within a very few months, where death has resulted from this excessive exhaustion. I therefore say that we ought to

have some more certain means than delivery to depend upon in these cases; for if this expedient is so important a means of saving life, how is it that it so often fails?

With regard to the mode of applying galvanism in these cases, I have used an electro-magnetic apparatus, contrived by Messrs. Abraham and Dancer, of this town, for medical and other purposes. It consists of a battery in a small jar, and a helix with conductors. For the sake of convenience the latter are connected with the helix by means of long wires, covered with an isolating material. The strength of the shock is regulated by a small contrivance situated on the stand of the helix, by means of which it can be either diminished or increased. One of the conductors, which is applied externally, has a hollow wooden handle, through which passes the wire before alluded to, in order to join a brass stem terminating at its extremity in a ball. The other conductor, which is contrived by myself, consists of a strong brass stem, seven inches long, curved to suit the vagina, and covered with a non-conducting material, having a small screw at its distal extremity for attaching to it a silvered ball; at its other extremity it is received within an ebony handle, which is hollow, and through which passes a strong brass wire, looped at the end, and connected with the long wires before alluded to. This wire is kept disconnected from the brass stem by means of a spiral spring concealed within the ebony handle. The loop is covered with silk, and is intended for the thumb of the operator, when he is bringing the wire into connection with the stem.

When the remedy is applied, the brass ball of the vaginal conductor is to be passed up to the os uteri, and moved about at intervals, on to various parts of this organ. At the same time the other conductor must be applied to the abdominal parietes over the fundus uteri. Shocks may be also passed transversely through the uterus by simultaneously applying the conductor on each side of the belly.

The application should be used at intervals, so as to approximate in its effects, as nearly as possible to the natural pains. It may be continued until it meets the exigencies of the case.

Before concluding the lecture, I wish to observe that it is stated that galvanism has been applied in labour before. When the idea first suggested itself to me, however, it was original to my mind, as I was quite unaware of its ever having been alluded to before. And I may say, with regard to its application in cases of hæmorrhage, and the modifications I have suggested in order to make it effectual in some of the varieties of that accident, that I believe I have been the first to employ it.