REMARKS

ON

SOME PHYSIOLOGICO-PATHOLOGICAL PHENOMENA OF THE CIRCULATION IN PREGNANT WOMEN.*

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THE modifications wrought in the circulation under the influence of pregnancy are of great physiological and pathological interest. The phenomena by which these modifications are revealed throw a valuable light upon certain anxious clinical problems, and afford distinct indications in practice. These modifications may be classed under two heads: 1. Changes in the constitution of the blood; 2. Modifications in the dynamic conditions of the circulation. In every pregnant woman, changes easily discovered in both these conditions are present; but in some exceptional cases evidence of a special and more striking character shows itself. The right interpretation of these exceptional cases depends upon our knowledge of the general laws that govern the circulation in the pregnant woman. Unless they be rightly interpreted, we might be led into serious practical errors.

I need not do more than refer to the general facts established by Andral, Becquerel, and others, as to the alterations induced in the blood itself during pregnancy. They found increase of water, diminution of red corpuscles, increase of fibrine. These changes do not, perhaps, occur universally; but they are certainly frequent. Of late years, it has been recognised that leucocythæmia—that singular disease in which the white corpuscles acquire a remarkable preponderance—is especially liable to arise under the influence of pregnancy; and it is enough for the present purpose to call to mind the various empoisonments of the blood which arise from obstructed excretion, as when urea and uric acid or biliary matter accumulate in it, the kidneys or liver being overtaxed. It would lead me away from the path I propose to follow, were I to pursue this subject.

With regard to the dynamic changes, it is desirable to say a few words. Since the researches of Natalis Guillot, Larcher, Duroziez, and others, it is, I believe, admitted that there is a normal hypertrophy of the heart induced by pregnancy. I have myself made observations which satisfy me of the truth of this proposition in some cases; and visible evidence is occasionally obtained in the production of enlargement of the thyroid gland, and that prominence and brilliancy of the eyeballs known as Graves's disease. This exophthalmic goitre is sometimes induced by pregnancy. Here it must be regarded as an exaggerated expression of the physiological increase of the heart's force. Other evidence exists of this increased action. The pulse is usually somewhat quicker than in the non-pregnant state. There is strong ground for the conclusion that a greater volume of blood is flowing in the vessels. Two organisms have to be supplied; and, when the foetus is thrown off, a considerable quantity of blood, which may be regarded as surplus, is commonly discharged, without any obvious detriment to the mother. The sphygmograph supplies direct testimony to the increase of tension of the arterial system. Dr. Mahomed has ably illustrated this point in reference to the albuminuria of scarlatina, and incidentally with reference to the albuminuria of gestation (*Med.-Chir. Trans.*, vol. lxxv); and in a paper in the last volume of the *Obstetrical Transactions* by my son, Dr. Fancourt Barnes, are some interesting tracings showing this increase of tension. In my Lumleian Lectures (1874), I dwelt upon the increase of nervous irritability induced by pregnancy, showing that conditions which would not excite convulsion in the non-pregnant woman were sufficient to do so in the pregnant. Now, increased nervous tension can hardly exist without influencing the circulation dynamically; and that influence will be shown in increased vascular tension. Again, the new developmental natus set up in the uterus of necessity attracts a large supply of blood to this organ, and induces increased vascular activity analogous to that which Hunter described as taking place during the growth of the stag's horns.

Passing from these general facts, let me invite attention to the hæmorrhages, not alone the uterine, which occur during pregnancy. In the first place, we must take note of the remarkable hyperæmia

which is commonly seen in the skin and mucous membranes of pregnant women. In some women, this hyperæmia is general; but in most it is prominently marked in the veins of the breasts; and in the vagina, vulva, rectum, and inferior extremities, to such a degree as often to afford the best proof of pregnancy in the early months.

I will now offer a few clinical illustrations of the peculiar erethism of the circulation in pregnancy. The great development of the vascular system of the pelvis, seen in the deep purple colour and the turgid state of the cervix uteri, vagina, and vulva, frequently passes into marked phlebectasis; the varicose condition forming prominent masses in the vagina and vulva, and often being attended by varicosity in the superficial veins of the thighs and legs. This often begins early in pregnancy: an important fact to remember, because it affords strong presumption against the theory that the cause is pressure exerted by the enlarged uterus upon the pelvic veins. Cases have been known of these distended veins bursting and giving vent to fatal hæmorrhage. Mr. Towne of Kingsland told me of a case which occurred under his observation. This phlebectasis usually starts with the first pregnancy, subsides after labour (the veins, however, rarely if ever quite recovering their natural condition), and returns with every succeeding pregnancy. The following cases are ordinary illustrations.

CASE I. *Phlebectasis and Tendency to Exophthalmic Goitre.*—In November 1861, I saw at the London Hospital a woman aged 34, who had had two children. She was then three months pregnant. The veins of both legs became enlarged during the first pregnancy, and again in the second; and there had been some oedema of the legs before the actual pregnancy. In January following, when she was about five months gone, the venectasis was more marked; there was a very large bunch of veins on the inside of the right thigh, very painful and "throbbing". She suffered intense headache. The carotids throbbed visibly. There were increased impulse of the heart, and slight prominence of the thyroid body. She was subject to palpitation, and the face was often injected.

CASE II. *Phlebectasis.*—In February 1862, I saw at the London Hospital a woman aged 28, who had had three children. She was then six months pregnant. She complained of frequent faintings. She had a large coiled mass of varicose veins in the right labium; one vein, of the size of a goose-quill, inside the thigh, communicated with this mass. The right foot swelled; the veins were quite elastic; there were no thrombi in them. She had noticed some varicose swelling with the third pregnancy; this quite disappeared. There was general deep hyperæmia of the vagina, and the superficial veins of both legs were varicose.

CASE III. *Phlebectasis.*—On July 14th, 1873, Mrs. George W. consulted me in her third pregnancy. During her first pregnancy, she began to have dilatation of the veins of the right leg especially, and slightly in the left leg. This subsided after labour. It returned in the second pregnancy, and again subsided after labour. It was now very marked, although she was only about three months gone. The right foot swelled a little at night. The saphena up to the femoral ring was all dilated. There was a large bunch of distended venous plexus at the inner side of the knee. Her general health was good. She had worn an elastic stocking up to the knee.

This is a very common case. The following one is a curious example of the puzzles to which this vascular development may give rise when it is much exaggerated.

CASE IV. *Phlebectasis; remarkable Case, simulating Cancer.*—In February 1863, a woman came under my care at the London Hospital, who had been delivered in 1860, and had since had two abortions. She was seven months pregnant. She "felt something come down" a fortnight ago, which "she believed was the child's arm". There was some flooding at the time. I found a mass of rounded soft botryoidal swellings inside the labia, extending all along the urethra, and filling the vagina. These were varicose veins; in parts, the appearance was like that of small projecting cysts. It suggested, and for a time was mistaken for, malignant disease. She could not sit down. After some weeks, the condition was less prominent. She was delivered without trouble. All varicosity vanished.

The following case is an illustration of the influence of menstruation upon the superficial circulation.

CASE V.—In July 1863, I saw Mrs. G., who had been married three months. Her menstruation had been scanty before marriage; since then, painful and more copious. Between the periods, there was anæmia, and the feet swelled. She had several spots on the legs, which enlarged, reddened, and became confluent, at the menstrual periods.

The following case affords a different illustration of the same thing.

CASE VI. *Nævus increasing under Pregnancy.*—A few days ago, I

* Read before the Metropolitan Counties Branch.

saw at St. George's Hospital a woman aged 44, who had her last child eight years ago. She bears a large nœvus on her left cheek. She says it grew bigger every pregnancy, and has ceased growing since she left off having children.

The three following cases are examples of the difficulty under which the heart labours in some cases of pregnancy. In two of them, there was ascertained hypertrophy of the heart.

CASE VII. *Heart-hypertrophy from Pregnancy.*—February 29th, 1868. Mrs. B. had had two children, the last ten months ago, weaned after two months. Menstruation was regular. She was anæmic. She had great palpitation; tumultuous action of the heart; wine set it palpitating. There was hypertrophy of the heart. All her trouble dated from pregnancy.

CASE VIII. *Hypertrophy of Heart and Thyroid Body.*—In November 1861, I saw at the London Hospital a pregnant woman who had had four children and four abortions. At the last pregnancy, two years ago, the placenta "grew to the left side"; puerperal fever followed. She observed enlargement of the thyroid, and suffered from palpitation, soon after the first labour. She was now five months gone. The os uteri was soft and patulous. There was purple congestion of the vagina. She had had two "shows" early in pregnancy. Her feet swelled this pregnancy, as they did in the preceding one. She had a suffocating feel in the throat, with increased impulse of the heart, and a slight blowing sound communicated to the arteries of the neck. The pulse was 100, small. She was relieved by treatment, and was delivered at term.

CASE IX. *Palpitation during Labour.*—In May 1863, I met Mr. Kesteven on the case of a lady in labour, who had had many children. During and soon after her last labour, she was seized with alarming palpitations and syncope. In actual labour, the progress was slow; and, similar impairment of the heart's action being apprehended, Mr. Kesteven sent for me, in case it should be desirable to accelerate labour. But labour was terminated naturally.

The apprehension felt in one of these cases is sometimes realised. Syncope, ending in sudden death, may occur. This, I have little doubt, is the explanation of two cases of sudden death during labour to which I have been summoned; and, if death do not occur by sudden failure of the heart's action, it may ensue from extravasation of blood in the brain. Apoplexy is one of the accidents to which pregnant women are exposed. This is most to be dreaded during the increased tension of the vascular system attending the expulsive act of labour.

CASE X. *Death from Blood-Effusion in Brain.*—In a case observed in the maternity of St. Thomas's Hospital, the woman was in her seventh labour. Convulsion, stertor, and syncope set in before the expulsion of the child. The child was expelled alive. The mother died twenty minutes afterwards. A small clot, quite recent, was found in the left thalamus opticus; and another, of larger size and of a dissecting character, in the left crus cerebri. The abdominal and pectoral organs were healthy.

CASE XI.—On September 28th, 1862, I saw the wife of a medical friend. Her age was 37. She had had ten children, and no abortions. Latterly, she had been getting stout, staying much at home. Being about two months pregnant, on September 19th a sudden gush of blood, estimated at a pint and a half, escaped with some pain. In the evening, she suddenly sprang up in bed, and fell back paralysed on the left side. Stertor followed; but there was some return of consciousness next day. Complete coma set in in the afternoon. Dr. Ramsbotham saw her in the morning. He found the ovum not detached. He thought the case hopeless. I saw her at 8 p.m. She was in deep coma with stertor. There was no swelling of the legs. The urine had been suppressed for twenty-four hours; it had not been tested. Thinking it possible that the cerebral symptoms might be connected with albuminuria, I examined the state of the uterus. The cervix admitted the tips of the fingers; the ovum was partly detached. I therefore passed one finger into the uterus, and brought it away. She died the same night.

In the above case, the complication with albuminuria could not be verified; but, in a considerable proportion of the fatal cases of puerperal eclampsia, lesion of the vessels of the brain, and effusions of blood and serum, have been found.

CASE XII. *Effusion into the Pericardium.*—Sometimes effusion of blood takes place into the serous cavities. Thus I remember a singular case of which I saw the necropsy in the service of Dubois, when I was a student in Paris. A young woman in her first pregnancy was expecting her labour. When in the act of straining at stool, she died almost instantly. The pericardium was found full of blood, fluid and coagulated. The aorta had given way through the bursting of a hydatid cyst in its wall. The growth of this cyst had thinned the wall, so that, under the increased tension, a rupture took place.

I have also known blood-effusion into the peritoneum take place in pregnancy, forming retro-uterine hæmatocele. Anyone who has seen the intensely turgid state of the vessels of the Fallopian tubes and broad ligaments during pregnancy, will appreciate the probability of this accident. When effusions take place into the brain, or when the heart fails in its action, death or grave injury is the inevitable result. When effusion takes place into the pericardium, if the quantity of blood be at all considerable, recovery can hardly be expected; but if the peritoneum be the seat of the effusion, the subject may escape after shock and peritonitis. Fortunately, hæmorrhages are more frequent from the mucous membranes: and, therefore, there is provided a natural outlet. Although these mucous hæmorrhages are sometimes so profuse as to induce danger by anæmia, they must in their design and first tendency be regarded as salutary, as instances of a conservative process. It would be easy to adduce examples of hæmorrhage from all the mucous tracts. But I would especially draw attention to some cases of hæmoptysis, of hæmatemesis, of hæmorrhage from the bowel, and from the urinary tract.

Hæmoptysis is of especial interest, because it naturally gives rise to the suspicion of tuberculosis. I have known this error to be committed most frequently in cases of hæmoptysis from disturbance in the menstrual function. But it is very important to remember that bleeding from the lungs may occur as a simple consequence of pregnancy.

The subject of the following case, as well as her family, is well known to me; so that I can affirm, with some confidence, that there is no tubercular element.

CASE XIII. *Hæmoptysis in Pregnancy.*—May 1873. Mrs. J. L. A., a young lady, was seen by me a month before her delivery of a child, now ten months old. She suckled until two months ago; when she left off, because the milk disagreed with the child. She menstruated all through lactation, until four months ago, when she fell pregnant. From that time, she had been liable to cough and morning sickness. On waking at 6 A.M., she felt blood in the mouth; this excited cough; and free hæmoptysis of bright red, in parts frothy, blood mixed with small clots followed; then came vomiting at times to a very distressing degree. She had not lost flesh. The chest was well-developed—*bombé*. There was some degree of harsh respiration in the right chest; the left was quite normal. I prescribed nitric acid, digitalis, oxalate of cerium, and Pullna water. The hæmoptysis ceased in a few weeks. She still vomited at times. She then suffered from palpitation and a disposition to syncope, which she had had to a less degree before pregnancy. The hands and feet swelled. At a later period of pregnancy, she had more œdema, and some albumen appeared in the urine. She was carefully watched, and was delivered of a healthy child at term without further trouble. She nursed the child, and has enjoyed good health, without return of hæmoptysis or cough to the present time. I find a note of an observation made of this lady in 1867, when she was fourteen years old, that there was rather strong respiratory sound in the centre of the right chest. The subsequent appearance of albuminuria is very interesting, as confirming the theory that hæmoptysis was due to increased vascular tension. At this moment she is in good health.

CASE XIV. *Hæmoptysis in Pregnancy.*—October 1874. A medical friend consulting me about his wife, told me that, in the seventh month of pregnancy, she had, every two or three days, severe hæmoptysis. Dr. Peacock, who examined the chest, found no disease.

Dr. Montgomery relates a case in which hæmoptysis recurred in five successive pregnancies; the last one running into hydatidiform degeneration of the placenta.

The two following cases are interesting illustrations of hæmorrhage from the bowel due to pregnancy.

CASE XV. *Hæmorrhage from Bowel during Pregnancy.*—On December 18th, 1872, I saw Mrs. A., with Mr. Lammiman. She was a young woman, five months gone in second pregnancy. During her first pregnancy, for the first time, she had frequent losses of blood by stool. These diminished after labour, but recurred now and then whilst suckling. They had been much more frequent and copious since she had been pregnant again. The blood came sometimes in clots; sometimes fluid and bright. It came after stools, without pain, and daily. She was somewhat anæmic; the pulse had the "hæmorrhagic jerk". She declined examination; but Mr. Lammiman had examined the rectum, and said there were no piles, and no disease as far as he could reach. After her last labour the abdomen remained large. The possibility of there having been some ulceration of the mucous membrane or glands of the colon occurred. But the more probable explanation was hyperæmia of the mucous membrane, or dilatation of the hæmorrhoidal vessels. I advised turpentine enemata, and half-drachm doses of turpentine by the mouth. This treatment was followed for a fortnight; when, being somewhat improved, the patient refused to go on with it. She then took twenty-drop doses of tincture of perchloride of

iron three times a day for about a month, at the end of which time the bleeding had almost ceased. She was delivered on April 7th, 1873. Very little bleeding attended the labour. She continued in good health until January 1875, when she aborted at about three months' gestation. The bleeding from the bowel had occurred very slightly. Possibly (observes Mr. Lammiman) it would have increased had the pregnancy advanced. She bled very moderately during the abortion, and has since (May 13th, 1875) remained in good health.

CASE XVI. Hemorrhages from Bowel and Threatening Mania during Pregnancy.—In May 1872, I saw, with Dr. Williamson of Mildmay Park, a delicate lady who had had seven children in less than seven years. When we met, she was five months gone. From the beginning of pregnancy, she began to have repeated and copious losses of blood by the anus, coming in large clots, and leaving her very blanched and prostrate. Latterly, she becomes almost maniacal and imbecile from the losses. She had also had four hemorrhages from the vagina. She complained of no marked pain in the stomach or intestinal canal. There was no vomiting. As far as could be ascertained, there were no piles or other morbid condition within reach of the finger. The urgent question to determine was whether the pregnancy could be allowed to go on. Looking at her extreme prostration, the likelihood of the losses being repeated, and the danger of her breaking down in body and mind, we decided upon the induction of labour. Dr. Williamson reported to me "that the hemorrhage continued, and that he therefore provoked labour. The hemorrhage ceased immediately after labour; and she made a good recovery. She has since become pregnant, and again the hemorrhages returned. About the third month, she had a mental shock, and aborted. All unfavourable symptoms ceased; and she has been quite well ever since. She has had no maniacal symptoms since. There is no family tendency thereto." Within the last week (May 1875), Dr. Williamson has completed her history to the present time. She has been pregnant a third time, and again the hemorrhages returned. As her strength was giving way, Dr. Williamson induced miscarriage about the third month, and again the hemorrhage ceased immediately. "She has not now been pregnant for a year, and is strong and well. When you saw her, she was anæmic, and very much emaciated; she has now a good colour, and is much stouter; she is much more active, cheerful, and her intellect is clearer and better than it has been for years." The complication with maniacal tendency is extremely interesting. The combined vascular and nervous tension of pregnancy are important factors in the production of insanity.

CASE XVII. Hemorrhage from Bowel after Labour.—Mrs. A. consulted me on April 29th, 1875. She had had five children, the last in October 1874; she did not suckle it. She passed half a pint of blood by bowel after labour.

The following is an example of hæmatemesis. When we reflect upon the extreme pressure thrown upon the stomach by the vomiting of pregnancy, it may seem surprising that hæmatemesis is not more common.

CASE XVIII. Hæmatemesis in Pregnancy.—C., aged 26, had had four children. She menstruated regularly, and during lactation. Her last child was born nine months ago; she had not suckled it. She was now (May 1875) five months pregnant. Since her pregnancy, she had vomited blood two or three times a day. There was no menstrual or leucorrhœal discharge. She was giddy, faint; "her head turned round"; she could not walk; was anæmic. The pulse was very feeble. There was pain in the right hypochondrium. In previous pregnancies, she vomited, but not blood. She took sulphuric and hydrocyanic acids, and got better.

CASE XIX. Eclampsia: Hæmatemesis: Epistaxis: Albuminuria.—In February 1875, I saw, with Dr. Lees of Camberwell, a woman seven months gone in her fifth pregnancy. Her previous labours had been hard, but there had been no convulsion. She was in fair health three weeks ago, when her husband went to sea in very bad weather; she feared he was drowned. Headache, giddiness, and some disturbance of sight came on; and her face was observed to be somewhat puffed. She had not noticed movements of the child for a fortnight. Convulsion broke out on the 23rd and 24th. The ring was a little tightened; there was no other mark of dropsy. Some days before the first fit, she had vomiting of blood. Labour was provoked the same day; some convulsive symptoms appeared. The fœtus was expelled dead; it had been dead sometime. A severe fit attended the extraction of the placenta. She bled at the nose, and considerable uterine hemorrhage took place. After this, there was no return of convulsion. The symptoms were those of anæmia. The urine contained much albumen.

Dr. Lees has kindly continued the history. "A few days after my last report, Mrs. W. was seized with vomiting, which lasted thirty-six hours, followed by dark brown tongue, sleeplessness, and pulse 120,

which, during the following fortnight, fell to 72. Since then, she has become apparently well; has been for a few weeks into Warwickshire. I saw her yesterday; she looks very well; the menses appeared about a week ago, lasting five days. The urine is still albuminous; but one-third as much as when you saw her. She has always had slight hæmoptysis during her pregnancies, never hæmatemesis. She has occasionally troublesome attacks of bladder-irritation." Here, again, we observe concurrence of hemorrhage from a mucous tract, and albuminuria, illustrating the general increase of vascular tension.

Hæmorrhage from the urinary tract is, in its clinical aspects, the most interesting of the hæmorrhages of pregnancy. It is not, however, easy to estimate it at its exact significance. It may be complicated with albuminuria, or it may be simply oozing of blood. Albuminuria may, indeed, be regarded as a form of hæmaturia. The observations of Dr. Mahomed upon this point are of extreme value. I will cite some of his observations. "Previously to the commencement of any kidney-change, or to the appearance of albumen in the urine, the first condition observable is high tension in the arterial system." "If this condition of high tension be sufficiently severe, transudation of the characteristic crystalloids of the blood, notably hæmoglobine, occurs before albumen appears in the urine; and they can be detected in that fluid by the guaiacum test for blood." The transudation of albumen, then, which is so often observed in pregnancy, and which is so often attended by disastrous disease, may be regarded as allied to hæmorrhage. This alliance is further exemplified in the following case.

CASE XX. Pregnancy: Dropsy; Hæmaturia.—I saw in the London Hospital a patient of Dr. Parker, a young woman married about six months. She menstruated one month afterwards; was four to five months pregnant. For some weeks, she had had general dropsy; the labia majora being much distended. There were no nervous symptoms at this time. There were hydræmia and palpitation. There had been blood in the urine. When this had passed away, some urine which I examined was acid, slightly albuminous. There was no evidence of other disease. The albumen detected here might have been due to a little blood lingering in the urine. There was no opportunity of following up the case.

Here it may be interesting to note the analogy between abortion in uterine gestation, and the cataclysmic hæmorrhage attending rupture of the sac in Fallopian and other forms of ectopic gestation. Rupture of the tubal gestation-sac, which usually occurs about the second or third month, may be regarded as abortion. The conditions are similar. Hæmorrhage, probably under ovarian excitement and increased tension, is an universal phenomenon. Just as uterine hemorrhages and abortions are especially prone to occur at menstrual epochs, so it is with the hæmorrhages of tubal gestation. Indeed, I have elsewhere shown that uterine hæmorrhage frequently attends the rupture of the sac and the intraperitoneal hæmorrhage.

I have referred to the conservative tendency of some of the hæmorrhages in the preceding cases. In this connection, it is deeply interesting to examine the hæmorrhages which take place from the genital mucous tract. This is obviously the most natural, as it is the most frequent, source of hæmorrhage. Blood escaping by the vagina may be poured out from the body of the uterus, from the cervical canal, from the vaginal portion, and from the vagina. Occurring with more or less marked periodicity, it has been described as menstruation during pregnancy. And provoked, as it undoubtedly often is, by the increased nervous and vascular tension of recurrent ovulation, it may fairly be regarded in this light. During the first two or three months, blood may be discharged from the decidual cavity—that is, from the free surface of the decidua vera and decidua reflexa. But, I believe, a more frequent source is the mucous membrane of the cervical canal; and this is more certainly the case when there is abrasion or loss of epithelium at the os externum. In this latter case, the villi of the mucous membrane, being unprotected, bleed on the slightest touch, and presumably will do so on any increase of vascular congestion or hyperæmia.

All the phenomena we have noted as occurring in pregnancy may be observed under the influence of menstruation, supplying further proofs in addition to the many which physiology supplies of the close affinity between these two conditions.

Mucous hæmorrhages must in many cases be regarded as a means of taking off excess of arterial tension; and thus of averting disastrous hæmorrhages into the brain, or abortion. And in many cases where the hæmorrhage, instead of escaping from the free mucous membrane of the uterus proper and cervical canal, is extravasated into the placental tissue, or into that part of the decidua which is in immediate relation with the ovum, abortion is the almost necessary result. But in many of these cases, too, the same conservative action is manifest, abortion being the means of averting a more serious catastrophe.

To pursue the reflections which the facts and considerations I have so imperfectly stated suggest, into all their bearings and applications, would be a task beyond my present power, and beyond your patience. I must be content with indicating a few general conclusions.

1. There exists in pregnancy a peculiar state of the blood, an increased arterial tension, and a disposition to phlebotaxis, general or affecting particular vascular regions or systems, which may, under certain circumstances, lead to hæmorrhagic effusions.

2. These hæmorrhagic effusions may be salutary or conservative. Hæmorrhages from the mucous membranes, by relieving excess of tension, may avert internal hæmorrhages or abortions, or that oppression of the kidneys which results in albuminuria and eclampsia.

3. Hæmorrhages from the uterus inducing abortion may, in the same way, avert more serious mischief, especially albuminuria and eclampsia.

4. But these hæmorrhages, although we may recognise in them a conservative purpose, easily exceed physiological or useful limits, and may themselves induce danger by anæmia.

5. Hæmorrhages, from whatever part, occurring in women within the period of sexual life, should suggest the probability of pregnancy, or of menstrual disorder.

6. The hæmorrhages described should be taken as indications to reduce vascular tension. This may be done in some cases by bleeding, general or topical; by purgatives; by salines; by abstinence from stimulants; by regulation of diet: by digitalis, hydrocyanic acid, and other means.

7. Bleeding from the arm may avert abortion, not only by reducing arterial tension, but also by a derivative action determining the direction of the blood from the pelvis to the opening in the vein. This derivative action of bleeding was much relied upon in a variety of cases by Lisfranc.

8. In some cases, where the hæmorrhages are frequent and great, and induce serious symptoms, the induction of labour is indicated.

FURTHER OBSERVATIONS ON THE ELECTROLYTIC DISPERSION OF TUMOURS.*

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FINDING that there is still much difference of opinion concerning the therapeutical value of electrolysis as used for the dispersion of tumours, I am led to think that a short summary of my more recent experience on this subject may be welcome to the members of the Association. There are now so many and effective modes of treating the various forms of morbid growths which are met with in practice, that it would hardly be allowable to add another means to those already at the disposal of the surgeon, unless it could be shown that it possessed peculiar advantages of its own over other methods used for the destruction of these growths, or that it was applicable to such forms of tumours as are otherwise unmanageable or rebellious to treatment. This I hope to be able to do for electrolysis in the following communication. It seems to me now pretty well ascertained what this remedy can do and what it cannot do; and I think it unlikely that its limits of usefulness will either be much curtailed or much enlarged by further researches.

It is not my purpose, on the present occasion, to describe the chemical and physiological principles on which the electrolytic treatment is based, as I have done so fully on previous occasions, and more particularly in the last edition of my treatise on *Medical Electricity*. I will, therefore, only say that in electrolysis the constant voltaic current is conveyed to the tumours by means of gold needles, which act either in fixed rows, or singly in any direction that may be required by means of the serres-fines conductor; that either the influence of the negative or of the positive, or of both poles simultaneously, is utilised; and that the effects are not owing to the development of heat, and have consequently nothing to do with the galvanic cautery.

In cases where only the negative pole is used, as, for instance, in bronchocele, the operation is not painful if properly performed; but, where both poles have to be inserted into the tissues, as in nævus, sebaceous tumours, etc., a good deal of pain is generally experienced by the patient, and chloroform or some other anæsthetic may, therefore, be used under such circumstances, if thought advisable.

1. *Nævus*.—One of the commonest tumours met with in practice is nævus of the face or scalp. Although this is not, as a rule, dangerous to life, it is nevertheless desirable to have it removed, as it disfigures the person affected with it. Almost every surgeon has a favourite plan

of treating nævus, with the results of which he is well satisfied; but I doubt whether any other mode of removing some of these unsightly marks is as good as electrolysis, and those who have once used it will probably always use it again. Over excision, it has the advantage of being entirely bloodless; over the injection of perchloride of iron, that it is not dangerous to life; over cauterisation by nitric acid, that it can be better localised, and acts more thoroughly; over the subcutaneous ligature, that, once the operation has been performed, no further suffering is caused to the child, or trouble to the medical attendant; and over the galvanic cautery, that it does not leave a scar. It is rapidly successful in the flat round tumours of the size of a shilling, which are only slightly raised above the skin, but acts less quickly in extensive "port wine marks". Where nævus assumes the form of large fleshy masses or lumps, the treatment is rather tedious, and, unless the patient perseveres, not so satisfactory in its results. An ordinary round flat nævus yields to one electrolytic application, while in extensive "port wine marks" half a dozen or more applications may be required. The current should be directed to the tumour by means of fixed rows of gold needles, connected with both poles of ten to fifteen cells of Becker-Muirhead's battery. As soon as the connection has been made, a destruction of the texture of the nævus is seen to commence, the blood-vessels and the skin withering away rapidly under the eyes of the operator. The destruction is more thorough at the positive than at the negative pole, and the worst parts of the nævus should, therefore, always undergo the influence of the former. As a rule, not a drop of blood is lost during the operation; but if, by sudden movements of the child, one of the needles should come out prematurely and a drop of blood should appear, this can be immediately coagulated, and any hæmorrhage checked, by applying the positive pole to the puncture. The whole mass of the tumour is then gradually brought under the influence of the current, care being taken not to act too long or too energetically upon any one point, as otherwise a scar might be left. When everything morbid appears to have been destroyed, the action is discontinued, and the surface covered with a piece of goldbeater's skin. There is no pain or discomfort after the operation; no dressing is required, for there is no discharge; the scab remains dry, and falls off in ten or fourteen days, leaving a healthy surface which gradually assumes the appearance of the surrounding skin.

2. *Bronchocele*.—Cystic bronchocele yields to a number of operative procedures, such as the seton, injection of iodine, or perchloride of iron, etc. Amongst these means, electrolysis may claim a foremost place from the comparatively painless nature of the proceeding, the absence of risk to life, and the circumstance that there is, as a rule, no open wound or sore produced which requires dressing. The best mode of proceeding is to insert two or three needles singly into the cyst, and connect them by means of the serres-fines conductor with the negative pole of the battery, while the positive electrode connected with a moistened sponge is placed on the skin in the neighbourhood. The consequence of this is, that the liquid in the cyst is decomposed, the chloride of sodium solution being changed into one of caustic soda, whereby the secreting membrane of the cyst is cauterised and prevented from effusing further liquid. From two to six applications appear to be sufficient for a cure.

Solid Bronchocele is much more difficult to deal with, and the ablest surgeons of the present day habitually refuse to interfere in such cases, there being imminent risk to life attached to such operations as were previously practised. These tumours, however, often become dangerous to life by pressure on important neighbouring organs; and electrolysis then steps in as the right thing in the right place. I have of late years combined injections of the tincture or liniment of iodine into the substance of the tumour with the electrolytic applications, as it seemed to me that by such combined treatment time was gained. Iodine, subcutaneously injected, appears to break up the internal structure of the tumour, more especially where this is very old and tough, and aids electrolysis by allowing a freer passage of the current through the mass. In recent tumours, electrolysis alone is sufficient; but most cases which have been under my care have been of many years' standing.

I will now relate the particulars of a case of double solid bronchocele which I have treated in this manner, and which may be considered typical of this class of cases.

CASE.—J. L., aged 37, single, a native of Yorkshire, and engaged in a mercantile firm in the city, came under my care in April 1874. He had for the last ten years been subject to a tumour in front of the left side of the neck, involving the thyroid body, which had very gradually increased until it reached an inconvenient size. The patient had on various occasions consulted the heads of the surgical profession in London, with the view of having it removed. This, however, was

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