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 phlebotasis, 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.*

By JULIUS ALTHAUS, M.D., M.R.C.P.Lond.,
Physician to the Hospital for Diseases of the Nervous System.

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

* Read before the Surgical Section at the Annual Meeting of the British Medical Association in Edinburgh, August 1875.

not considered expedient by the eminent men whose opinions the patient had sought, and nothing had been done except painting the skin over the tumour with iodine, which had no beneficial effect. Things had gone on for a considerable time in this manner, when, on April 10th, suddenly a fresh tumour appeared on the right side of the neck, over the collar-bone. This was accompanied by an increase of temperature in the parts, and the swelling showed considerable pulsation. At the same time, alarming symptoms of pressure on the pneumogastric nerve became apparent; viz., loss of voice and of the power of swallowing, a sense of choking in the throat, and severe pain at the back of the head, on the right side. There was regurgitation of liquids through the nose, and the patient had not slept for four days and nights, but was obliged to sit up in bed propped up by pillows, or to lean forward in a chair.

Under these circumstances, he had again consulted Sir William Fergusson, and entreated him to operate. Sir William, however, declined to do so, and the patient was then sent to me by his usual medical attendant, Dr. Black of Islington. I first saw him on April 13th, 1874, and found him in the following state. The pulse was 120; respirations, 36; anxious expression of countenance; eyes staring and protruded; excessive action of the left ventricle. He had not been able to eat or sleep for four days, and could only talk in a whisper. In front of the left side of the neck, there was a tumour of the size of a small orange, which was very hard, and showed no signs of fluctuation. It was limited interiorly by the thyroid cartilage and the windpipe, which were considerably displaced to the right side; exteriorly, by the strongly pulsating carotid artery; superiorly, by the horizontal branch of the lower jaw; and inferiorly, by the apex of the trigonum supraclaviculare. On the right side, there was a small but strongly pulsating tumour occupying the space of the supraclavicular triangle. It was much softer and less prominent than the one on the left side. The circumference of the neck on the most prominent point of the left side was $16\frac{1}{4}$ inches, and on the right side $15\frac{1}{2}$ inches.

The patient was in such a state of prostration, and so racked with pain and distress, that I thought it best to commence the treatment with an external application of the constant current, for the purpose of soothing and strengthening the central nervous system and diminishing the effects of pressure upon the pneumogastric. He recovered his voice almost immediately; had some sleep the night after, and no more regurgitation of liquids. Next morning, the expression was less anxious; the pulse had gone down to 90 beats; respirations, 28; the voice went away and came again from time to time. On April 15th, he reported that he had had four hours' sleep; eating had become easier; he had drunk off a whole tumblerful of beef-tea without trouble, and the voice was stronger. The tumour on the right side was smaller, and its pulsation much diminished. The headache was still intense, and did not seem to be affected by the external application of the current. On April 19th, I introduced a needle connected with the cathode of fifteen cells of Becker-Muirhead's battery into the tumour on the right side, and allowed the current to pass through it for fifteen minutes. On the 21st, the patient reported that he had eaten some fowl and pudding, and that the headache was nearly gone. The old tumour on the left side was now likewise attacked by electrolysis and parenchymatous injections of iodine.

I will not weary your attention by further details about the treatment and progress of this case. Suffice it to say that by the middle of May the tumour on the right side had entirely disappeared, and that the left was then shrinking visibly under the influence of the treatment, which was continued, with some considerable intervals, until the middle of March last. At that time, there was only just a trace left to show that there had been once a tumour; the circumference of the neck was reduced from $16\frac{1}{4}$ inches to $13\frac{3}{8}$ inches. The patient has since resumed his work in the city, and was, when I last saw him (July 1875), in all respects in good health. Sir William Fergusson had an opportunity of examining him again about that time, and expressed to me his gratification at the successful result of my treatment in a case which he had thought beyond surgical interference.

It may be asked whether the result in this case was more owing to electrolysis or to the injections of iodine. Having carefully watched the effects of both, I have come to the conclusion that, of the two agents employed, electrolysis was by far the most effective. Indeed, one of the tumours yielded entirely to this alone in a comparatively short time. The iodine, however, unquestionably aided the action of the voltaic current in the manner described above; and I have since then, in view of this result, treated similar tumours again in a similar manner.

3. Sebaceous Tumours.—These occur not unfrequently on the face and scalp, and are excised without difficulty; but, as many patients have a great dread of any cutting operation, however trivial, and as

erysipelas, with fatal results, has been known to supervene upon the removal of sebaceous tumours by the knife, even where the operation was performed in the most skilful manner, it will often be found expedient to resort to electrolysis, which rapidly destroys these tumours without any risk to life, and without leaving a scar. Both poles in the growth act more quickly than the negative pole alone.

CASE.—In June 1874, Dr. Seton of Thurloe Place sent a lady to me who had an atheroma as large as half a chestnut on the scalp. This had become developed, as she thought, in consequence of her having knocked her head against a table about two years ago; and, as it caused disfigurement, she was anxious to have it removed. I electrolysed the tumour on two consecutive days; on the third day, it had almost entirely withered away, and only a small trace of it was left, which was likewise easily removed. The application was unpleasant, but not bad enough for chloroform to be used; and the electricity took away not only the atheroma, but also a headache from which the patient had previously suffered.

4. Recurrent Fibroid.—In this form of tumour there is, as its name conveys, great tendency to relapses after excision; and the growth is sometimes so intimately connected with organs important to life, that the ablest surgeons not unfrequently refuse to interfere. Recurrent fibroid is frequently the seat of intense pain; it is very disfiguring when situated about the face and neck; inconvenient, on account of the size to which it may attain in any other portion of the body; and, if allowed to grow, it ultimately exhausts the most buoyant vital powers. As excision fails to cure these tumours, another means of treating them seems, therefore, to be imperatively called for.

My experience with electrolysis in recurrent fibroid is as yet not particularly favourable, probably because the cases which have been under my care were of very long standing, and in them the tumours had attained an enormous size. If the treatment were used immediately upon the first signs of relapse after excision, the result would most likely be better.

CASE.—A gentleman, aged 28, single, who had been a long time in Australia as sheep-farmer, came under my care in December last. He had been living on a very poor diet, eating no vegetables and little else but salt beef for a considerable period. About four or five years ago, he was kicked by a horse on the left cheek, and some months after that a tumour made its appearance, which involved the cheek and left side of the head. This was excised at Sydney three years ago, and a large cicatrix which runs from the ear down to the external angle of the jaw marks now the place where the incision was made. The patient nearly died of hæmorrhage after the operation, but ultimately recovered. It was, however, not very long afterwards that signs of a relapse manifested themselves, and the new growth became at last so large and painful, that he wished to undergo another operation. He, therefore, consulted the heads of the surgical profession in London with this view; but Sir James Paget, Sir William Fergusson, and Mr. Cæsar Hawkins pronounced against an operation, and Sir William Fergusson then sent him to me. The patient was of spare habit, and had a feeble pulse. There was an immense tumour occupying part of the left cheek and the left side of the head, displacing the ear upwards and backwards, filling up the stylo-mastoid fossa and reaching a considerable way up to the left parietal bone. He also had large packets of swollen lymphatic glands on the neck, and could wear a collar but with great difficulty. The substance of the tumour was exceedingly hard, more osioid than fibroid, and its surface livid, showing tendency to ulceration. Electrolysis was commenced on December 16th. One of the first results was, that the pain, which had been severe, especially at night, was relieved, the tumour became softer and smaller, and the surface assumed a healthier colour. Sir William Fergusson, who saw the patient again on January 8th, expressed to me his satisfaction at the progress of the case. Unfortunately, the treatment could not be persevered with for a sufficient length of time, as the patient did not live in London, and circumstances rendered it difficult for him to stay. The tumour was still very large when the treatment was discontinued; but, on the whole, the result was so far encouraging as to warrant my recommending an early resort to electrolysis in such cases, more especially where the tumour has not yet attained such an immense size as was the case in the present instance.

5. Cancer.—In primary scirrhus, early and complete excision is the best treatment; but, in epithelioma and secondary cancer, electrolysis is often of essential service. We are not able by this means to eradicate the cancerous diathesis, or to prevent the tendency to death; but it is most effectual for the relief of the pain; besides which it promotes sleep and appetite, and appears to soothe and strengthen the system generally. It often renders the last few months of the existence of these wretched sufferers comparatively happy, and smoothes the road to dissolution, which is otherwise for them only too thickly beset with tortures.

CASE.—A housekeeper, aged 38, single, came under my care in November last. Sixteen months ago, she first noticed a swelling in the right breast, which gradually grew larger, and was excised in February 1874. Five weeks later, a fresh tumour had already formed, and was likewise removed by excision. Soon afterwards, numerous cancerous nodules sprang up about the cicatrices in the axillary glands, and also in the left breast; and, as further surgical operations appeared unadvisable, Mr. Irvine sent her to me. When I first saw her, on November 23rd, the cancerous cachexia was strongly marked. There was intense weakness and depression of spirits; the face bore an expression of agony; the complexion was sallow; there was complete loss of appetite, great wasting, restlessness at night, a pulse of 120, and sixty respirations in the minute. Towards evening, well marked febrile movements set in, and there was excruciating pain, more especially in the left shoulder.

Under these circumstances, no treatment could be expected to produce a decided change in the aspect of the case; but, as the patient and her friends were most anxious that something should be done, electrolysis was suggested. On November 30th, I introduced a needle connected with the cathode of Becker-Muirhead's battery into one of the cancerous nodes on the right side of the chest, and placed the anode to the left shoulder. The power of current was gradually raised from ten to thirty-five cells, and it was allowed to circulate for ten minutes. Immediately afterwards, the patient expressed herself as considerably relieved. I saw her again two days later, when she informed me that she had had less pain ever since, had slept better, and felt stronger and more cheerful. On December 14th, the cancerous node which had been electrolysed had disappeared, the tumour in the left breast was smaller, the pain was gone, the pulse had fallen to ninety beats, and the inspirations were only thirty-six in the minute. The patient said that she hardly felt any discomfort at all; looked wonderfully better, and entertained hopes of perfect recovery. During the intense frost which prevailed at that time, she caught a severe cold, which prevented her from coming to see me again, and she died on January 15th, 1875, from congestion of the lungs, but without a return of the pain. I should add that I also prescribed for this patient morphia, chloral, and quinine; but these remedies appeared to do little good, while, immediately after each electrolytic application, a decided change for the better took place.

I have now put before you as concisely as possible what I believe to be the advantages and limits of usefulness of the electrolytic treatment, and trust that you will henceforth use it more extensively in suitable cases than has hitherto been done.

USE OF PERCHLORIDE OF IRON IN *POST PARTUM* HÆMORRHAGE.

By LOMBE ATTHILL, M.D.,
Master of the Rotunda Lying-in Hospital, Dublin.

THE case recorded by Mr. Boddy, in which death followed almost instantaneously on the injection of a solution of the perchloride of iron, conveys a very important lesson. It is, as far as I am aware, the first recorded case in which there are just grounds for believing that death was due to the use of the styptic; but, even here, the cause of death remains doubtful, there not having been a *post mortem* examination, a matter greatly to be regretted. Mr. Boddy's conclusion that "without doubt death resulted from the action of the solution of iron upon the lining membrane of the uterus" is not, in my opinion, correct. First of all, the uterus has not, immediately after delivery, any "lining membrane" properly so-called; next, Dr. A. H. Ringland has, in several cases of *post partum* hæmorrhage recorded by him, carried the solid perchloride into the uterus and applied it direct to the interior of the uterus without producing any injurious results (*vide Proceedings of the Dublin Obstetrical Society*, session 1873-74).

I am not in a position to give an explanation of the cause of death in Mr. Boddy's case; but I believe it proved from Dr. A. H. Ringland's cases, in which he applied the solid perchloride to the inner surface of the uterus, and from my own (*Dublin Medical Journal*, April 1874), in which I injected a small quantity of a strong solution into the uterus, that the application of the styptic to the inner surface of the uterus is not *per se* a dangerous practice.

I would point out that in Mr. Boddy's case an unnecessarily large quantity of the styptic was injected; for, though "the hæmorrhage ceased immediately on the injection of the solution", the process was continued till the patient gave a shriek and died; and to this continuance of the injecting process after the purpose for which it had been employed was attained, the fatal result, in my opinion, is to be attributed,

which probably would not have occurred had but three or four ounces of a strong solution (one part of the strong liquor to two of water) been employed.

I think the profession are under a great obligation to Mr. Boddy for publishing this case.

THE TREATMENT OF SPINA BIFIDA.*

By JAMES MORTON, M.D.,
Surgeon to the Royal Infirmary, Glasgow; etc.

PREVIOUSLY to October 1871, it was the habit, with others as well as myself, to regard cases of spina bifida as hopeless, and to discountenance the idea of surgical interference. It was well known that they had been dealt with in a variety of ways, some of these reckless and rash, others more or less prudent, almost all proving in the end unfortunate. It was also known that in some few instances a spontaneous cure had taken place, but these were truly, like angels' visits, few and far between. It was universally admitted that very many died, in truth by far the greater number, the precise numerical proportion being difficult to arrive at; the conviction being general that only a very small percentage lived for any great length of time. As a proof of this, the prognosis usually given was a very hopeless one, and seldom falsified by the result.

So entirely had this view of the malformation taken possession of practitioners, that it was the custom to limit their efforts to what was called the palliative treatment, such as protection, or defence from injury, carried out in various ways, so as to avoid ulceration and bursting of the sac with its fatal ending. Up till the date mentioned, I was a follower of the do-nothing system; but, on October 2nd, 1871, a case was presented in the Glasgow Royal Infirmary, which prompted me to reconsider the question, more especially as the child was otherwise healthy, and I felt a strong desire to give it a chance. On turning my attention to the numerous methods previously employed, too numerous to mention here, it appeared to me that injection was the safest, as that could be effected without permitting the complete escape of the fluid contained in the protrusion. The kind of fluid to be injected next demanded consideration, when it occurred to me that a solution of iodine, less diffusible than either a spirituous or watery solution, would best suit my purpose, as being less likely to permeate the cerebrospinal fluid with rapidity, and, therefore, less likely to cause shock or bring on convulsions. With these views, I caused the following solution to be prepared, which is now known as the iodo-glycerine solution.

R. Iodi x gr.; potassii iodidi xxx gr.; glycerinæ j ʒ.
From half a drachm to two drachms of this fluid have been used, according to the size of the spinal protrusion.

Previously to injecting, I considered it prudent to make a tentative puncture, to ascertain whether such interference would be tolerated, and followed this course in the first case and most of the others. To close the openings made both by grooved needle and by trocar, collodion and flexible collodion have both been used, and have served the purpose, so that either may be employed. This mode of treatment was first employed by me in October 1871, and the details of the case are given in the abstract of a clinical lecture which appeared in the number of the BRITISH MEDICAL JOURNAL, dated April 6th, 1872, after having been shown to the members of the Glasgow Medico-Chirurgical Society on February 1st of that year.

The second case was shown to the same Society on May 30th, 1872, and was published in the JOURNAL named on June 15th succeeding.

Dr. J. R. Watt of Ayr successfully followed the same plan in two cases; one of which appeared in the BRITISH MEDICAL JOURNAL of April 26th, 1873, the other in that of January 31st, 1874, with a well executed photograph of the patient after cure.

Another case treated under my own care is published on October 24th, 1874, in the same JOURNAL. More recently a case has been successfully treated by Mr. Angus of Newcastle, which appeared in the JOURNAL for April 17th, 1875; and, in a private note with which he kindly favoured me, he expressed his confidence in the method employed if conducted with due care.

Since the beginning of this month (July 1875), I have treated another case with the like good fortune, and without a disagreeable symptom. The fluid was twice analysed by Professor Ferguson of Glasgow, but gave no indication of the presence of sugar.

During the past winter, a large cervical spina bifida was presented to me, which was several times injected without any appearance of

* Read in the Surgical Section at the Annual Meeting of the British Medical Association in Edinburgh, August 1875.