grammes, that is, there is still a deficit of ten grammes, and he is still starving, but more slowly than at first. Now feed him eighty grammes, and he excretes eighty-five. Finally, if he receives eighty-five grammes daily the excretion remains the same, that is, he gets enough nitrogen for his needs, and has reached the nitrogen equilibrium. If he receives more than this amount of nitrogenous food, say ninety grammes, he at first excretes but eighty-five grammes, the balance being stored up in the tissues, but if the same amount of ninety grammes be fed for several days his excretions of nitrogen will gradually increase to that limit. In other words the nitrogen equilibrium may be reached at various points, the lowest being that at which the supply is just sufficient to balance the daily loss. On the other hand, if the animal be fed on non-nitrogenous food the amount of nitrogen excreted at first is nearly equal to that excreted when the supply and need balanced, but rapidly decreases till it reaches a tolerably constant excretion, representing the destruction of organized albumen. Here it should be stated that when more nitrogen is taken in than the minimum necessary to keep the body in nitrogen equilibrium, the effect of the surplus is to put the body in better condition for performing work. Knowing, then, the chemical composition of fresh meat, dry albumen, etc., we find that 3.4 grammes of nitrogen is equivalent to 100 grammes of fresh meat; also that 15.6 grammes of nitrogen is equivalent to 100 grammes of dry albumen. This amount of dry albumen will contain, besides the nitrogen, hydrogen, and oxygen, 50 grammes of carbon. Besides the amount of carbon that comes out in CO_2 from the lungs a certain amount is excreted in the urea, twenty per cent. of which is carbon, so that having examined the nitrogen excretion, and determined the amount of albuminoid material which must have been decomposed to furnish it, and having made the proper allowance for the carbon contained in this albuminoid material, we can say that any amount of carbon which appears in the urea or in expired air over and above that corresponding to the albumen must be derived from non-nitrogenous food. Now, having determined the amount of nitrogen excreted in the urine and fæces, and the carbon excreted in the urea and from the lungs, we know that a certain amount of nitrogenous and non-nitrogenous decomposition has taken place. In other words, we have a test by which we can determine the amount and kind of organized material undergoing decomposition in the body in a given time.

What causes this decomposition, this retrograde metamorphosis? When physiological chemistry was in its infancy, in the days of Lavoisier, it was supposed that it was due to the presence of inspired oxygen, but very soon it was found that the mere presence of oxygen was not sufficient to cause such a change, that though oxygen must be present to enable the final products of decomposition to be excreted, still it might be present and no change take place. The real cause is as yet unknown, but must be sought for in connection with the living protoplasm with which the organic substances of the food are brought in contact. It is well known that many chemical compounds, the constituents of which have only a feeble affinity for each other, may be broken up by dialysis or filtration. Alum, for instance, is a substance which is composed of elements whose chemical union is so slight, and which differ in rapidity of filtration to such a degree, that it may be broken up into an acid and a base by filtering. It is

not improbable that the living tissues through which the products of digestion diffuse may play a similar part in initiating decompositions.

Let us next consider the food ingested with reference to the energy to be liberated by its decomposition. This gives rise to several problems. In the first place, the object of taking food may be to provide the body with materials to set free mechanical force, that is, to get as much muscular strength as possible; or, in the second place, it may be to enable the body to produce as much heat as possible; or, thirdly, the problem may be to increase glandular activity, to stimulate the secretion of milk in nursing women, for example; fourthly, it may be desired to restore or to build up the tissues, as in convalescence from an exhausting disease; or, fifthly, to build up and strengthen the nervous system, and enable it to act with ability and promptness. Thus there is a variety of problems depending on the kind of force wanted. It will be noted that only in the first two classes is any energy set free from the body. In these two the condition of affairs outside the body of the individual may be directly altered. In the other three the results are confined wholly to the body and within the body. We will now proceed to take these up in order, and we will begin with that form of energy known as motion or mechanical work.

Original Articles.

A CASE OF COMPLETE INVERSION OF THE UTERUS,¹ TREATED BY THE MODERN METHOD, WITH RULES FOR CARRYING OUT THE PROCEDURE.

BY CLIFTON E. WING, M. D., BOSTON.

SOME time ago² I reported to this Society a case of inversion of the uterus of fourteen months' duration successfully replaced by the "continued gentle pressure" plan of treatment, without the use of anaesthetics, and without pain to the patient. The following case, treated by the same simple means and with equal success, will serve as another example of the advantages of this method.

The case was seen in consultation with Dr. Moulton, of Lawrence, Mass.

The patient was a primipara, aged nineteen. Of the confinement the doctor writes me as follows: "Mrs. —'s labor commenced about twelve o'clock on the night of December 7th, and was completed December 8th, about eight o'clock P. M. It was, to all appearances, a natural instrumental delivery, that is, nothing occurred different from usual in forcep cases. We (Dr. Dana was present in consultation) waited fifteen or twenty minutes, and then made slight traction upon the cord. The placenta came without any particular assistance, as usual, but immediately after it occurred complete inversion of the uterus. There was great flooding. The placenta was somewhat attached to the inverted fundus, but was easily removed. I pushed the protruded uterus back into the vagina at once, but did not feel justified in doing anything further at the time on account of the patient's exhausted condition, for she became pulseless and we feared immediate death; but, under brandy,

¹ Read before the Section for Clinical Medicine, Pathology, and Hygiene of the Suffolk District Medical Society, February 14, 1883.

² November 29, 1879.

opiates and ergot, she rallied towards morning. She gradually gained strength up to the time when you saw her on the thirteenth day."

At the time of my first visit, Mrs. —'s pulse was small and feeble, about 120 in the minute, but she was comfortable, without fever, and of excellent courage. Examination found the uterus, completely inverted, lying in the vagina. Upon compressing it with the fingers a distinct gurgling was heard, and I have little doubt that a coil of intestine was inside the inversion. The placental site was at the lowest portion, and I had the rare opportunity of plainly seeing the condition of this part two weeks after delivery in the living woman. The surface was very rough and irregular, and looked as much like the opened surface of a good-sized carbuncle as anything I can compare it with. Here and there were yellow masses looking like the sloughy tissue seen in carbuncles, some being depressed, others elevated above the surface. From the appearance I was at first doubtful whether portions of the placenta were not still remaining, but the doctor told me that the placenta had come away as complete as usual. The result showed that he was right, for at the end of a fortnight the surface had become as smooth as the rest of the mucous membrane, and during this time nothing was noticed coming away. I could not help thinking how easy it would be, with such an irregular surface in a uterus in normal position, to introduce placental forceps and remove what might easily be mistaken, from gross appearances, for "remains of placenta."

The upper vagina was very large and lax after the confinement, and the largest stem I could introduce through its entrance did not fill its cavity so that I much feared it would slip off to one side of the inverted organ when the pressure was applied. However, I did the best I could with the stems I had with me, and applied the waistband and elastic tubes, giving me the desired pressure. Next day it was found that the stem had slipped to one side in the vagina, as I feared it would, and nothing had been accomplished. I made no further attempt at reduction for two weeks. I had been in doubt as to the expediency of keeping the hard end of the wooden stem pressing upon the part in such condition. Two weeks later I made another attempt. To avoid the difficulty encountered before (the slipping of the stem to the side of the inversion), I took a wooden stem of a size easily passed into the vagina and fastened to its upper end a "Gariel Inflated Pessary" of such size that, when blown up, it completely filled the cavity of the vagina; introduced collapsed, it was inflated through its hollow tube after it had passed the constricted vulva, and then the apparatus could not slip off the uterus. I applied the pressure as before and left the patient. Twenty-four hours afterward the fundus had retreated through the dilated cervix. A similar wooden stem, small enough to pass inside the cervix and follow up the retreating fundus, was then substituted, and on my visit the succeeding day the womb was found fully replaced, its cavity measuring somewhat over three inches. The only inconvenience complained of by the patient during the treatment was that incident to lying still upon one side while the apparatus was on. I learn from the doctor that the patient made a rapid recovery of strength, and is now visiting friends at a distance.

In recent years decided changes have taken place in the treatment of chronic inversion of the uterus, and

the modern method, namely: *Relying entirely upon gentle continued pressure properly applied to the inverted organ* to perform the cure of the patient, for such it can certainly be termed, would seem to leave but little room for improvement in the future.

When it is considered that this method is almost sure as to its result, is usually entirely painless, does not necessitate the use of anæsthetics, is so simple that any physician can conduct it successfully with apparatus improvised for the occasion, can be carried out without even exciting the fears of an ordinarily sensible patient if the practitioner previously explains to her his purpose and method, and, finally, that it leaves the woman un mutilated and again capable of maternity,¹ the gain, from the time — only a little while ago — when amputation of the inverted organ, with its attendant great fatality, was the sole resource of surgery, can be appreciated.

So many advantages has this latest method over all other plans of treatment which have been tried, and its results, when it is properly carried out, have been so successful, that I believe we are now in position to assert that *in all cases of inverted uterus — excepting of course certain cases seen immediately after the accident has suddenly happened in childbirth, before the cervix has had a chance to firmly contract — attempts at reduction by any other means than by continued moderate pressure applied to the inverted organ by mechanical apparatus are best dispensed with.* At the least they should be postponed until this method, *properly tried*, has failed, and in the rare cases where this happens, if it happens at all, it is hard to say what method of replacement will succeed. Amputation of the inverted uterus bids fair to become an extinct operation.

The following rules, some of them directly opposed to what is taught in the leading text-books, may be laid down for the conduct of the operation: —

(1.) *The pressure is to be confined to the part inverted.*

This is accomplished by the employment of some form of vaginal stem repositor, the upper end of which is brought to bear upon the inverted part. Aveling's instrument is curved, corresponding with the curve of the pelvis. I have used straight stems and found them perfectly satisfactory.

The elastic vaginal bag distended with air or water should not be depended upon in these cases. This is the means commonly recommended and employed. With it the pressure cannot be confined to the displaced uterus. It is both inefficient and injurious. "The bag being in contact with the vaginal walls over a much larger surface than it is in contact with the inverted uterus, in accordance with well-known laws much more of its power is expended in dilating the vagina and stretching the surrounding tissues than in elevating the uterine body. This very distention of the vagina, if the bag be forcibly inflated of itself, often causes more pain than the patient can bear, as is well known by many who have employed such bags as vaginal tampons in cases of uterine hæmorrhage. When success has followed the use of the vaginal bag in cases of inversion either the vagina and surrounding tissues have been remarkably tolerant of distending force or, as has undoubtedly been the usual case, the uterus has been replaced by remarkably little contin-

¹ The patient whose case I previously reported, where the inversion had lasted more than a year, has since had a child, the labor being, in every way, normal.

ued pressure exerted upon it. It is evident that a full and fair trial of continued pressure cannot be made in this way. Although the inefficiency of the elastic vaginal bag has been repeatedly pointed out and written about, it is still resorted to in such cases: and when it has been found on trial that the patient could not bear its continued use, or that it did not replace the uterus, the operators, often those who might be expected to know better, have generally concluded that the uterus was too sensitive for continued pressure treatment, or that pressure faithfully tried had proved a failure. Often, too, the pelvic pains and tenderness caused simply by the distention have been mistaken for the symptoms of pelvic peritonitis."

There is no better or simpler device for producing the desired pressure than two pieces of elastic rubber tubing (that which is attached to the common household syringe does excellently) passed between the thighs and tied by their middle to the outer end of the stem used, their ends being brought up, before and behind, and tied to a waistband, which may be nothing but a common towel folded and fastened about the body.

By regulating the tension of these elastic cords both the amount and the direction of the pressure can be easily controlled.

(1.) The use of an inflated cushion attached to the upper end of the rigid stem is, so far as I know, new. In this case it was used, as explained before, to prevent the stem from slipping off and by the inverted organ. It answered its purpose perfectly, and moreover made such a soft pad to press against the mucous membrane of the womb that I think it would be a good idea to use such a one, of proper size, in every case. Still the part bears the pressure better than might be expected. The device is a simple one, and it would seem might occur to any one's mind; but in recently looking up cases of inversion reported in the journals, I was interested to find in the *Dublin Journal of Medical Science*, 1881, the report of a case occurring in the practice of Dr. Loombe Athill, of the Rotunda, Dublin, in which the same difficulty was experienced that I had found on my first attempt at reduction in this case (that is, the upper end of the stem could not be kept on the womb). In Athill's case both Aveling's and White's methods and instruments were tried with the same failure, and finally amputation of the displaced organ was resorted to. I have no doubt that a simple contrivance like the one employed by me would have avoided the difficulty and rendered the operation unnecessary.

(2.) *To avoid risk of septicæmia the vaginal stem should be removed at proper intervals and the parts thoroughly cleansed.*

(3.) *All attempts at manual reduction (taxis) during the treatment are to be avoided.* "They are unnecessary, must add to both the mental and the physical sufferings of the patient, and, moreover, rob the method of its greatest advantage, its simplicity."

(4.) *"A pad or other counter-pressure on the abdomen," recommended in such cases by some writers, should not be employed.*

The action of the vaginal walls in gradually and constantly pulling open the cervix, or, when the cervix has resumed its proper position, the constricted portion above, thus aiding the inversion to gradually unroll itself and assume its natural position, does not come into play until the vaginal walls are put upon the stretch, and pressure upon the abdomen tending to keep the

whole uterus low must act to prevent this. Moreover it must oppose the action of the vaginal stem in pushing the inverted fundus upward.

(5.) *Anæsthesia is not to be employed unless specially indicated in the given case.*

The process from first to last is not a painful one. The patient being conscious, the physician can better judge of the amount of pressure which it is advisable to use, and the risk of doing harm is lessened.

The view formerly held that the difficulty of reduction increases in proportion to the duration of the inversion has been proven to be erroneous by the results of cases treated by this method, and in certain cases of acute inversion at childbirth where the shock is very great (as with the patient whose case I report), and hæmorrhage does not make immediate interference a necessity, probably the chances of the patients will be increased by postponing for a while all attempts at reduction. This however is a rule of procedure to be followed in but few cases if the physician is present immediately the accident has happened, but we know that the chance of reduction becoming impossible at a later period is now reduced to a minimum. In my previous case, where complete inversion had existed fourteen months, reduction was accomplished with as much ease as in this case of only four weeks' duration. Post-mortem examinations have taught us that pelvic adhesions are extremely rare in these cases. Barnes concisely states "the possibility of adhesions opposing reduction may be practically disregarded if gradual elastic pressure be employed (in the reduction)."

The "stage of involution after confinement" does not counter-indicate reduction by this method, although attempts at replacement by the other more forcible and rougher methods, during this condition of the parts, are certainly dangerous. In our case reposition was accomplished with perfect ease and success four weeks after confinement. It was not done when I first saw the patient (two weeks previous) because of the want of a suitable instrument. It was not convenient for me to attend to the case during the interval. During this time the placental site, which, in this case, being the lowest portion, received the pressure, had become, in appearance, like the rest of the mucous membrane of the womb, but the patient had had two attacks of flooding, and, moreover, had developed a mild case of "milk legs" with febrile action. Her condition had not improved; she had not gained strength. I doubt, if in another case and provided with a stem-repositor capped by an elastic cushion, such as my inflated Gariel Pessary made, I should fear to bring the steady slight pressure to bear upon even a recent "placental site."

EMBOLISM OF LEFT MIDDLE CEREBRAL ARTERY WITH APHASIA AND AGRAPHIA.¹

BY G. H. LYMAN, M. D.

IN December, 1871, and March, 1874,² I reported two cases of this lesion causing aphasia, in which the diagnosis was confirmed by subsequent autopsies. Although the consensus of opinion as to the location of the organ of speech, or rather as to the part of the brain which governs the symbolization of ideas by words, is now pretty decidedly in favor of the views

¹ Read before the Section for Clinical Medicine, Pathology, and Hygiene of the Suffolk District Medical Society, February 14, 1883.

² Boston Medical and Surgical Journal, vols. lxxxvi. and xc.