The needles previously employed by most operators seem to have been larger than it is at all necessary to use, whilst some of them, such as Weiss's modification of Dr. Duncan's needle, are unquestionably very much too large. Recognising the desirability of reducing to a minimum the chance of hæmorrhage through the punctures and of inflammation in the track of the needle, and, at the same time, of diminishing the painfulness of the operation, I was led to use a very small hare-lip needle. Of course, the needle must be large enough, and used in such a manner as to avoid all chance of breakage. The smaller the needle, the greater would be the amount of heat developed in it by the passage of the current, if this were strong and evolved from a large-plated Bunsen's or Grove's battery; but, using such a comparatively weak current as we employed from one of Foveaux's batteries, we get rid of the heat-effects, and also, therefore, of any disadvantage which might otherwise attend the use of a small needle. But, whilst it is desirable to keep down the strength of the current as much as possible, in order to diminish the shock and pain which its passage may occasion (Dr. Duncan, *loc. cit.*, page 8), and also with the view of avoiding, as much as possible, the two special risks of inflammation in the sac, or of inflammation or gangrene of the skin at the seat of puncture, we should do all in our power to increase the amount of chemical action excited by the weak current at the positive pole. For you must understand that the experiments of Dr. Fraser and others have unmistakably established the fact that the coagulation induced in the blood by the passage through it of a galvanic current, is wholly attributable to the electrolytic or chemical changes which the current occasions. If, therefore, after the fashion originally introduced by Steinlein, we cover the positive pole with an easily oxidisable metal, such as zinc, we are enabled to summon to our aid what Faraday always distinguished as the "secondary" effects of electrolysis. The salts as well as the fluid of the blood are decomposed by the action of the current, and a part of the oxygen and acids which are liberated at the positive pole will combine with the zinc and corrode the surface of the needle. Some of the salts thus formed will aid in producing further coagulation around the needle. Corrosion occurred to a marked extent in our last operation, when a current from eleven cells of the battery was allowed to act upon a needle which had been plated with zinc,* although no corrosion was produced in an ordinary steel needle submitted to the same influences. Of course, a gilt needle would be still less amenable to the action of these "secondary" effects of the current.

With regard to the strength of the current, it was found that eleven cells acting for half an hour, although producing no pain or obvious sensation at the time, did induce some amount of irritation of the skin around the punctures. The current from eight cells, however (the battery being in good condition at the time), produced, on the previous occasion, no irritation, so that all traces of this needle-puncture had disappeared in four or five days. This needle also was insulated within half an inch of its point merely by two layers of spirit varnish; and probably, in employing a comparatively weak current such as this, no insulating material is needed. This, indeed, is the opinion of Dr. Althaus. At all events, it seems desirable that the needle should not be pushed too far into the sac, and that the part of the needle actually in the sac and within its coats should not be insulated, because clot should form in contact with the wall of the aneurism, so that it may be left adhering to it on the withdrawal of the needle.

Conducted upon the principles now laid down, the treatment of aneurisms of the arch of the aorta or of other large vessels may, doubtless, in a large number of cases, be safely attempted by galvano-puncture. The treatment should be painless, non-irritating, tentative, and slow; and I believe that it is a method from which, in the future, we may look to obtain the most satisfactory results.

AN UNUSUAL FORM OF BIRTH.

THE following case, happening to me this week, and not being of everyday occurrence, may prove worthy of record.

Mrs. A. was in labour with her fourth child. A foot and hand presented; the second foot was sought for and brought down; at the same time, a head descended. Interference was now suspended, and presently, the pains being vigorous, a head and lower extremities were extruded together from the vagina. The advent of twins was announced, when another pain completed the birth of a single child thus doubled up. It was an eight months' child, and appeared to have been some time dead. The nurse stowed it away in a corner; but, to her astonishment, half an hour after my departure, a feeble cry was heard, and the little creature proved to be alive.

EDWARD GARRAWAY, Faversham.

* The needle was prepared for me by Messrs. Weiss and Co.

ON THE CAUSES OF UNAVOIDABLE HÆMORRHAGE DURING MISCARRIAGE OR LABOUR WHEN THE PLACENTA IS PRÆVIA.

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[Concluded from page 599 of last number.]

It is well known that the amount of blood lost may be very great, and produce alarmingly sudden death before any placental detachment takes place, and in every variety of placenta prævia; but it is a natural consequence of the laws of spontaneous premature detachment that, as a general rule, the hæmorrhage will be greater in proportion to the centrality of the placental attachment, and in proportion to the largeness of the body to be expelled—in other words, the age and size of the child; and I believe these statements are confirmed by clinical experience. When the placenta is centrally attached, the hæmorrhage begins with the early part of the dilatation of the internal os, and continues as long as in any other kind of previous placental insertion.

When, on the other hand, the placenta is prævia, but does not cover the os internum, nor has its margin close to it, then there may be some dilatation and progress of labour before detaching expansion takes effect or begins.

When the child is not premature and small, but at the full time and big, then the amount of spontaneous premature separation will reach its utmost, and may be considerably more than if the child were small; for a small child will pass through the internal os uteri and lower uterine hemispheroid when these are much less expanded than the degree of expansion, and consequent placental separation, required to transmit a big child.*

Most authors, among whom Legroux† enumerates Duparcque, Desormeaux, Dubois, and Depaul, ascribe to the pains an influence in increasing the hæmorrhage. Legroux, on the other hand, believes the hæmorrhage to be, in unavoidable as also in accidental cases, not systolic, but diastolic; not increased by pains, but arrested by them. He has satisfied himself of this by feeling it duly flow and stop in an actual case, and he points out that the increase of discharge simultaneous with the coming on of a pain is the result of the expulsion of blood accumulated during the absence of a pain; that the increase with the prevalence of a pain is apparent, not real. In these views Barnes‡ coincides. I also agree generally with the view of Legroux; but, in actual practice, I have not observed increase of bleeding with pains in unavoidable and stoppage in accidental hæmorrhage, with any such marked constant regularity even of appearance or seeming, as would lead me to accede to the diagnostic principle, so generally laid down, of increase with each pain in the flooding of placenta prævia and decrease with each pain in accidental hæmorrhage.

At the bedside, it is very difficult to get these various points verified, in consequence of confusion of blood flowing from vessels with blood flowing which has already been for some time extravascular, that is, in the uterus or vagina. One would, *à priori*, expect the following course, and I believe it to be consistent with most observations. Hæmorrhage will take place from vessels, in a more or less considerable gush, during and immediately after every act of separation or of increase of separation, but not necessarily with each pain. Such hæmorrhage will be with pains, not between them. It often happens that, while pains go on hæmorrhage stops for a time, and it is hereby explained. But hæmorrhage may go on between the pains, before the limit of premature spontaneous separation is reached, as in cases of accidental hæmorrhage. After the limit of spontaneous premature separation is reached, the hæmorrhage, if any, will be, as in accidental cases, during the absence of pains or between them. In thus describing the hæmorrhage, reference is made only to hæmorrhage from vessels, not to expulsion of blood from the vagina or uterus, which is so apt to obscure the evidence derivable from observations.

The latter part of this statement is clearly implied in the following passage from Gendrin.§

"Dans les cas où les eaux se sont écoulées peu à peu par une rupture

* "Suivant Puzos, les hémorragies sont rarement mortelles avant le cinquième mois de la grossesse. L'expérience confirme tous les jours la vérité de cette assertion." Desormeaux et P. Dubois, *Dict. de Médecine*, article Mitrorrhagie, 2nd edit., tome xix, p. 663.

† *Archives Gén. de Médecine*, 1855, vol. ii, p. 643.

‡ *Lectures on Obstetric Operations*, 2nd edition, p. 413.

§ *Traité Philosophique*, etc., p. 197.

des membranes opérée dans l'utérus, quelle que soit la partie du placenta qui réponde à l'orifice du col, l'hémorrhagie ne se montre plus que dans les intervalles des contractions utérines, et encore dans ces cas est-elle toujours peu considérable, et ne devient-elle véritablement alarmante que lorsque la matrice tombe dans l'inertie."

In hæmorrhage from placenta prævia during labour, as in all cases of flooding during pregnancy or labour, uterine action will constrict the bleeding vessels, and produce diminution of the area fitted to discharge blood; and although, in cases of unavoidable hæmorrhage, expansion of the bleeding area in one direction must go on during early labour, yet uterine action, by diminishing or contracting it in another direction, must always keep the area liable to bleed less than it would be were the uterine action or pain absent. Expansion without uterine action or pain must enlarge the bleeding area. But expansion goes on under the influence of uterine action or pain. Expansion under the influence of uterine action or pain may possibly increase the area liable to discharge blood, but instead of increasing it, it probably diminishes it. Certainly, the effect of the pain or uterine action must be to make the area liable to bleed less than it otherwise would be. Besides, the statements already made in explanation of cases of placenta prævia, which pass over without considerable bleeding, and the further considerations to be hereafter stated regarding the arrest of the bleeding, all tend to support the view that uterine action or pain does, *per se*, restrain or stop the hæmorrhage instead of increasing it, as most authors allege.

I am not, in this paper, discussing the subject of the arrestment of the hæmorrhage, but that of its causes. Yet to avoid misconception, I make a slight digression. I do not say that uterine action or pain stops the hæmorrhage. It may, I believe, have this beneficial effect in some cases. It certainly, always and in every case, does, *per se*, tend or help towards its arrestment, and not indirectly, but directly, by constricting vessels and diminishing the area liable to discharge blood.

Indirectly, in the early part of the first stage of labour, uterine pain causes or increases hæmorrhage by producing separation or increasing its amount, as has already been said. But this increase of hæmorrhage is not the direct result of the pains nor even a regular consequence of their supervention.

Simpson and Barnes, erroneously believing that the cervix is the placental site, and knowing that this part does not contract during and immediately after labour, as the body of the uterus does, have been led to unnecessary and misleading reflections based on these anatomical points. Simpson* calls attention to the rarity of bleeding when the placenta is separated from this uncontracting portion of the uterus. Barnes† describes the cervix as liable to paralysis for a time, and thinks this state is more liable to occur in labour with placenta prævia, and that it is then doubly dangerous. But such reflections on the influence of the placental site on the hæmorrhage are to be utterly disregarded, because founded on anatomical error. The cervix is never the placental site.

It is desirable, however, to have more knowledge of the condition of the placental site in placenta prævia, after premature spontaneous separation. In general features its condition is, no doubt, closely similar to the placental site after separation anywhere else. But what are its peculiar features?

While the area of the placental site is diminished in the longitudinal or meridional direction, it is much stretched and extended in the direction transverse to the uterine axis. The shrinking in the longitudinal direction is the direct result of muscular action, while the expansion in the transverse direction is passive, or a result of relaxation and an indirect result of the same muscular action. The same change of shape will affect the sinuses and their orifices. From these, blood may be discharged when the uterus is not in action, especially if the blood pressure is great. It appears to me that the peculiarity of shape of the vascular orifices and the peculiarity of the muscular action in this part, in early labour, in cases of placenta prævia, will have little or no special effect on the liability to hæmorrhage from it. In other words, the longitudinal shrinking, in cases of unavoidable hæmorrhage, will be as efficient in checking hæmorrhage as the corresponding amount of shrinking in every direction which may occur in certain cases of accidental hæmorrhage, or the longitudinal shrinking, without transverse expansion which may occur in other cases of accidental hæmorrhage. Many authors, among whom I mention Legroux,§ regard the openings

of the uterine sinuses in cases of placenta prævia as being made to gape (*béants*) by the peculiarities of the uterine retraction. But this is plainly erroneous; for while the longitudinal contraction will tend to close the vessels by bringing the upper and lower edges of their openings nearer to one another, so also will the transverse expansion, while at the same time it may render somewhat more distant the ends of the transverse diameters of the openings, giving them a more and more elliptical shape.

The more elliptical form, while it involves diminution of area, not increase or gaping, may perhaps involve slight increase of area above what would be the case were there only longitudinal shrinking without transverse expansion. But truly the state of the mere mouths or openings is a matter of little importance. They are big enough, when at their smallest, for the injurious purpose of transmitting a large quantity of maternal blood. The important matter is the alteration of shape of the sinuses, and this is outlined by the shape of the orifices. Now, the whole of this alteration of shape is favourable not to increased discharge of blood, but to its diminution; and there can be little doubt that any possible increase of area by transverse expansion will have much less effect in favouring increased discharge of blood than the change of shape will have in producing diminution of discharge. All this is a matter of hydraulics, and the principle involved may be thus stated. Diminution of area of a tube, with approximation of its walls, such as would be produced by pressure on the tube in one direction, will have very much more effect in diminishing the flow of a passing fluid than the same amount of diminution of area without change of mere shape, or such diminution of area as would be produced by equal pressure in all directions on the outside of the tube.* It must be admitted that, at present, it is impossible to apply this principle of mechanics exactly to the case on hand, but it must have important bearings such as are here pointed out.

The last cause of hæmorrhage, to which I shall refer, generally acts indirectly, but it may be even a direct cause of vascular rupture and hæmorrhage: it is the condition of the abdomen as to retentive power. When this important power is absent or annulled, and still more when the abdomen has an expulsive tendency, as in cases of hernia or of uterine procidentia, bleeding, in cases of placenta prævia, may even be induced, and certainly will be greatly encouraged. Mere plethora will, by loss of blood, soon be—for the time at least—destroyed, and no ulterior increase of hæmorrhage will arise from it. But when the mechanical conditions of the abdominal cavity are such as to favour evacuation, bleeding, in such cases as we are now considering, may receive a persistent and very baneful encouragement. In other words, the increase of blood-pressure due to mere local hyperæmia or general plethora may cause hæmorrhage, but will soon be annulled; whereas the increase of blood-pressure due to mechanical conditions of the abdomen may persist and favour the continuance of bleeding till it is checked by means sufficiently powerful; and this will be as true in cases of accidental and *post partum* hæmorrhage as in cases of unavoidable hæmorrhage. I may here add, that the beneficial influence of a vaginal plug is sometimes probably quite as much owing to its changing the mechanical conditions of the abdomen as to its mere mechanical pressure, exerted directly or indirectly on the bleeding vessels.

It appears to me that absence of retentive power in the abdomen, or the existence of an expulsive force, is the cause of those calamitous departures from the general laws of floodings which result in excessive or fatal losses. When this influence is at work there is great probability that the hæmorrhage will not be arrested by any of the ordinary causes of this fortunate event which operate during labour. The blood-pressure, direct or indirect—direct through the right side of the heart, indirect through impeded returning current—will keep blood flowing, chiefly in the absence of pains, from the open uterine sinuses, and perhaps from the marginal sinus of the placenta.

This cause of bleeding is illustrated in many conditions. One woman may have wound of a labium with trifling hæmorrhage; another, probably having varicosity of veins, produced by the same cause, will die of a slight wound entering such a vein in the same situation. One woman will lose little blood from a large wound of a vein in the leg; another, even while in the horizontal position, may die of bleeding from a very small opening in the same situation. A woman having an uterine fibroid, with a sinus on its surface opening into the uterine cavity, may have no bleeding, except when the blood-pressure is increased by standing or by local congestion; so most women will have no bleeding, in cases of placenta prævia, after the completion of spontaneous premature detachment, unless there be an unusual amount of blood-pressure in the uterine region.

* This seems to follow at once from the fact discovered by Poiseuille, that, under given circumstances, the flow through tubes of circular section is as the fourth power of the radius. This note and the relative text I owe to Professor Tait.

* *Selected Obstetrical and Gynecological Works*, p. 237.

† *Lectures on Obstetric Operations*, 2nd edition, pp. 401 and 421.

‡ The shrinking of the placental site, when it is above the region of spontaneous premature detachment, and below the fundus, must be almost entirely in the longitudinal or meridional direction. In the region of spontaneous premature detachment there is the same shrinking, but it is accompanied by transverse expansion. When the placental insertion is the upper uterine hemispheroid or fundus, the shrinking will be in every direction.

§ *Archives Gén. de Médecine*, 1855, tome ii, p. 653.