

ceding two or three days. He died, I afterwards learnt, some hours after my accidental visit. On inquiring of some of my professional friends in Lisburn, I find that no case of a similar description had occurred in the practice of any of them during the progress of the epidemic.

Lisburn, Belfast, Jan. 1846.

A SKETCH OF THE RELATION OF THE SPINAL MARROW TO PARTURITION & PRACTICAL MIDWIFERY.*

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THE Uterus is a muscle,—the largest and most important muscle of the animal economy. It supports the race in the same way that the stomach and the heart support the individual. It is the organ of nutrition and circulation to the species. Parturition, the chief function of the uterus, is performed like the functions of other muscles, under the direction of the nerves by which it is supplied. Those nerves have been beautifully made out by Dr. Robert Lee, and are derived chiefly from the third and fourth sacral nerves, and the hypogastric ganglia. Through its nervous endowments the uterus has the power of associating with itself other muscles, in a certain definite order, for the safe and efficient performance of parturition. But the act of parturition never had been, and never could be, studied properly, as a motor function, until the discovery of the physiology of the spinal marrow by Dr. Marshall Hall.

The Spinal Marrow is the central organ presiding over the motor actions of the uterus.

All the chief *physiological* uterine motor actions are *reflex* in their nature.

Other causes of uterine contraction are, *direct* or *centric* spinal action, the influence of *emotion*, and *muscular irritability*.

Contraction of the uterus from irritation of the mammary excitator nerves, as in the sucking of the child, or from irritation of the cutaneous nerves of the abdomen, as by the aspersion of cold water, are pure instances of *reflex spinal action*. In either case the direction of the motor influence is *from* the extremities of the incident excitator nerves *through* the spinal marrow, and then *to* the motor organ.

Contraction of the uterus from the administration of the ergot of rye is an example of *direct* or *centric spinal action*. Here the medicine enters the circulation, and its action on the spinal marrow is *intra-vascular*; the motor influence acts *from* the spinal marrow *to* the motor organ.

Contraction of the uterus from fear is an instance of the influence of *emotion*. Emotion may be induced by external objects, as from the sight of instruments; or it may arise within the mind, as from the remembrance of former suffering. In these respects there is some analogy between reflex action and the action of emotion or volition; but emotion and volition are *psychical*, excitomotor is *physical*. This constitutes such an immense difference, a difference so preponderating over the analogies referred to, that there is danger of great confusion in physiology, if the term *reflex cerebral action* (proposed by Dr. Laycock) should come to be generally applied to motions dependent either on emotion or volition.

The seat of emotion is not yet ascertained, but it acts *through* the spinal marrow and the spinal motor nerves, as would appear from the fact that emotional movements remain in parts entirely paralyzed to cerebral voluntary motion.

Contraction of the uterus from the application of galvanism is an instance of uterine action from *muscular irritability*. Here, the stimulus directly affects the muscular fibres of the uterus.

Volition may increase the action of the expiratory muscles after the dilatation of the os uteri, or it may bring them into action before this part of labour is completed; but the motor forces, dependent on the will, are *accessory*, not *essential* to the process of parturition; delivery may take place in cerebral paralysis with total loss of voluntary motion, the actions dependent on *reflex action*, on *emotion*, and on *muscular irritability*, all remaining perfect.

Delivery may take place in profound coma—many such cases are on record; or in paraplegia from disease in the middle portions of the spinal marrow, as in a case related by Ollivier, when both volitional and emotional action are subordinated, but labour proceeds by virtue of the reflex action and the muscular irritability which remain. It should be mentioned, that in simple coma, only emotion and volition are withdrawn; but in paraplegia from disease in the middle of the spinal marrow, there is also the absence of the expiratory reflex action, the abdominal muscles are now inactive.

In paraplegia from disease involving the whole of the lower portion of the spinal marrow, labour either does not take place, or proceeds with extreme inertia, as in a case related by M. Brachet; here volition, emotion, and all the reflex actions, are absent, and *muscular irritability* alone remains. Patients in this state have nevertheless been delivered by the stimulus of galvanism applied to the uterus itself.

Thus the motor actions concerned in natural parturition admit of an interesting synthesis and analysis; the obstetrician should be as familiar with the simple and compound forms of muscular action as the chemist with elementary bodies and their combinations.

The *type* of uterine action is rhythmic; the pains succeeding each other at regular intervals. The *rhythm* is probably dependent on the spinal marrow, being synchronous with the action of the expiratory muscles, which is undoubtedly reflex in its nature.

The *mode* of uterine action is probably peristaltic; peristaltic action has been observed by Müller in the uterus of the rat, and in the oviduct of the turtle. In the human female, the contractions appear, according to Michaelis and Wigand, to commence at the cervix, to extend from thence to the fundus, and then to pass downwards again towards the os uteri. This is analogous to what takes place in other organs possessing peristaltic action; the heart begins to contract at the auricle, the contraction traverses to the apex, and then returns; in the stomach also, on the authority of Magendie, contraction begins at the pylorus, proceeds to the cardia, and then sweeps back from left to right. The objects to be obtained by this double action in the uterus would seem to be the prevention of the descent of the umbilical cord, the ascent of the arms of the child at the commencement of the pain, in cases when they hang down, and in this way to prevent arm or shoulder presentation, and the prevention of inversion of the uterus. Intussusception of the upper part of the organ, and complete inversion, would probably be frequent if contraction uniformly commenced at the fundus.

The peristaltic *mode* of action appears to depend on the ganglionic nerves. The question may be asked, is peristaltic action anything more than the muscular irritability of parts supplied by the ganglionic system? The uterus contracts so as to expel its contents after death. In the œsophagus, which, like the uterus, is endowed both with *peristaltic* action and *reflex* spinal motion, Dr. Marshall Hall has observed distinct contraction after death; I have also observed the same phenomenon.

The excitors of reflex spinal actions in the uterus are numerous.

First in importance are the incident nerves of the whole length of the parturient canal, from the fundus uteri to the constrictor vaginae.

Irritation of the incident nerves of the ovaria and of the mammae, the cutaneous nerves of the abdomen and general surface, the nerves of the stomach, bladder, and rectum, all excite reflex uterine actions during labour.

A definite order is observed in the phenomena of labour.

With respect to that great problem in physiology and obstetrics—namely, the cause of the coming on of labour at the end of the tenth lunar month of gestation, nothing definite has hitherto been said. In the earliest part of the parturient process, which in my lectures I have been accustomed to call the *premonitory stage*, there is an equable, continuous contraction of the uterus, which exists for some time before the appearance of the periodical contractions. This equable contraction urges the head of the child firmly against the os uteri. What is the cause of this equable contraction? We must look beyond the uterus for the answer; for the uterus attempts to act in extra-uterine pregnancy. I believe the ovaria are the excitors of the first motor action of the uterus. It is well known that the majority of cases of abortion occur at what would have been menstrual periods, and it is equally well known that the entirety of the phenomena of menstruation depend upon the ovaria as their cause. In the human female, labour comes on at the tenth menstrual period from the time of conception; in animals also, as far as my observations have extended, the

* An outline of the present paper was printed in the first volume of Dr. Marshall Hall's "Practical Observations and Suggestions in Medicine."

term of gestation is some multiple of an æstrual period. Now the menstrual periods of the human female and the æstrual periods of animals are alike in this; that in the one case ova are chiefly prepared at these epochs, in the other solely. Further than this the analogy cannot fairly be pressed. It is too much to speak of any moral similarity between the human female and the lower animals in this respect. I consider, then, that parturition in the human female is essentially a menstrual period; but that instead of an ovule being thrown off from the ovary, an ovum is expelled from the uterus, and I compare the lochial to the menstrual discharge. In animals, the phenomena of parturition are more strikingly similar to those of æstruation; there is evidence that a similar state of the ovaria obtains. For instance, the guinea pig and the rabbit will admit the male immediately after delivery, and conception will follow the congress. In the mare also, a few days after foaling is the time chosen for the admission of the male. On these and other grounds I believe the ovaria to be the exciters of the first contraction of the uterus in parturition, but I am engaged in testing the matter experimentally. I shall excise the ovaria in animals which have conceived, and note the results.

The effect of the equable contraction of the uterus first induced, is, as I have said, to urge the head of the child against the os uteri. This is the most excitable part of the uterus, and after a time, irritation of the os and cervix call forth the pains which constitute the commencement of actual labour. The effects of irritation of the os uteri are shown in cases of premature labour induced by irritation in this situation, as by the introduction of a plug, and by certain cases where, from the pendulous state of the uterus, the head cannot be brought in apposition with the os uteri, and labour, in consequence, is put off until this cause of inertia is removed by an abdominal bandage, or the prone position. Irritation, then, of the os uteri must be looked on as a cause, though, in ordinary cases, a secondary cause, of the coming on of labour. I believe the ovarian nerves and the nerves of the os uteri, are as much the exciters of the motor actions of parturition, as the pneumogastric and the trifacial are the exciters of the motor part of respiration.

After the persistence of the premonitory stage of labour for a certain time, actual labour pains commence. The object now to be attained is the dilatation of the os uteri, and I therefore propose to call this the *stage of dilatation*. Throughout this stage, the body and fundus contract periodically. The contractions of the uterus in this stage are not so violent as they subsequently become. This is owing to the contact of the membranes and the amniotic fluid with the os uteri. At the same time, the os uteri and the vagina dilate. This dilatation is effected partly by the mechanical pressure of the membranes and the advancing head of the foetus, but the os uteri possesses a *positive*, as well as a *passive*, power of dilatation—a dilatation similar to the dilatation of the cardia in vomiting or deglutition. This *positive dilatation* is shown by the extreme suddenness with which it takes place after the existence of previous contraction, and by the sudden contraction which sometimes occurs immediately after the birth of the child, as in encysted placenta. The perinæum, the dilatation of which is *passive*, never contracts in this way. It is also shown by the form of the hæmorrhage in placenta prævia; after the separation of a portion of the placenta hæmorrhage is increased during the pains; if the dilatation were from mere pressure, the hæmorrhage ought to cease during the pains, and come on in the intervals. The direction in which the motor force is exerted in the stage of dilatation is *downwards and backwards*, in the direction of the axis of the pelvic inlet. In this stage of labour the motor actions are purely of a reflex kind, the excitor being the internal surface of the uterus, and particularly the os uteri. The centre of the nervous arcs involved in the uterine actions is in the lower part of the spinal marrow. In natural cases, emotion does not at all influence this stage physiologically.

During the *stage of dilatation*, various extra-uterine reflex actions occur. The actions of the bowels and of the bladder are excited, and in many cases vomiting takes place. At the time of the completion of the dilatation of the os uteri, several rigors affecting the whole muscular system are frequently experienced. Defæcation and micturition have evidently a beneficial purpose in enlarging the capacity of the pelvis; the nausea and vomiting promotes the dilatation of the os uteri, and is a preparation for the expiratory action of the next stage.

In the next stage of labour, the head of the child advances through the vagina to the os externum; this I propose to call the *stage of propulsion*. In this stage, the whole of the uterus

contracts upon the child, but new motor powers are now brought into play. Irritation of the os uteri only excited reflex motor action in the uterus itself, but irritation of the vagina excites both the uterus and the respiratory muscles. The contractions are also more violent, because the liquor amnii has now escaped, and the hard head and body of the child are in direct contact with the excitor surfaces. At the coming on of each pain, a deep inspiration is taken, and during the pain, expiration is protracted as much as possible where the pains are long. They consist, as far as the respiratory system is concerned, of several sudden and deep inspirations, followed by prolonged expirations. At the height of a pain in this stage, the glottis and cardia are *closed*, the abdominal and other expiratory muscles contracted, and the diaphragm inert, as in vomiting. All obstetric writers have taught the contraction of the diaphragm during the pains of this stage; but if it be considered for a moment that the diaphragm is a muscle of *inspiration*, while the parturient action is expiratory, the fallacy of such a view will be evident. It is true that the floor of the diaphragm remains plane during the effort at expiration with the glottis partially or entirely closed, but this is from the mechanical distention of the chest by the contained air, not from active contraction of the muscle itself.

It will be seen, that in the stage of propulsion the direction in which the motor force is exerted is different from what it was in the stage of dilatation. The direction the head of the child has now to take is *downwards and forwards* instead of *downwards and backwards*. It has to pass through the lower half of the pelvic segment of the circle of Carus, in the direction of the axis of the pelvic outlet. Obviously, a new direction of the motor force was necessary to effect this, and it is supplied by the addition of the expiratory action at this time. The action of the abdominal muscles urges the fundus uteri backwards against the spinal column, and assists in giving the head the proper direction while emerging through the pelvis. The mechanical adaptation of the foetal head to this progress has often been dwelt upon. Another object effected by the expiratory action is the compression of the uterus, which is thereby excited to additional contraction.

In this stage of labour, the nervous arcs concerned have their centres partly in the lower nodules of the spinal marrow, and partly in the medulla oblongata. There is this analogy between the medulla oblongata and the lower spinal marrow, that in the one are congregated the keys of the motor arcs of respiration, deglutition, and their various morbid actions; in the other, the centres of the motor arcs of parturition, defæcation, micturition, ejaculation, and conception, as far as the pelvic viscera are concerned. It cannot but be considered wonderful that the dilatation of the os uteri should only excite the nervous arc concerned in vomiting, while the dilatation of the vagina should only excite the respiratory arcs. In the stage of dilatation the motor actions are chiefly reflex; but both volition and emotion intervene in the stage of propulsion. The patient desires to press her feet against some fixed body, and to grasp with the hands, so as to increase the power of the expiratory efforts. When the pains are moderate, the woman utters only a prolonged and intermittent groan, owing to the contracted state of the glottis; but when the suffering, produced from the distention of the vagina, is excessive and unbearable, she utters a loud cry. This cry is a motor action, a powerful expiration, excited by the emotion of intense suffering; it opens the glottis widely, and immediately takes off from the uterine system all the extra-uterine pressure. Thus, the glottis may be compared to a safety-valve which is opened by emotion whenever the pressure becomes too powerful to be borne with safety.

In the next stage the child is born, and I have called this the *stage of expulsion*. The birth of the child is effected by the powerful action of the expiratory muscles, with the glottis and cardia closed, and by simultaneous contraction of the uterus and the whole parturient canal. At the moment of birth, the vagina is retracted over the head of the child by the action of the levatores ani, and positive dilatation of the sphincter ani and sphincter vesicæ occurs. The dilatation of these sphincters is partly produced by emotion, and partly by reflex action. It forms a most important provision for the safety of the perinæum. At the moment when this part is subject to the greatest amount of distention, these two sphincters suddenly relax before and behind it. We may thus see a reason for the situation of the vagina between the orifices of the rectum and bladder. Laceration occurs generally in first labours, and at this point primiparous women often suffer from feelings of delicacy. They should always be prepared beforehand for involuntary action of the bowels at this juncture, and impressed with the propriety of not preventing

it by volition, which otherwise they are, from motives of delicacy, prone to exert at this time. A napkin should be placed to receive any faecal matter that may be discharged. The regulation of the glottis by emotion is another provision for the defence of the mother from laceration at this period. At the moment of birth, the woman, affected with uncontrollable agony, gives a loud cry, which, by opening the glottis widely, releases the uterus from all expiratory pressure.

This completes the process of actual labour. The phenomena which follow are so far different, that I propose to treat of them as a *supplemental stage*.

When the body of the child is born, the contracting uterus follows it in its descent, and the action of the uterus, produced by the great excitation of the vagina, is such, that in many cases it at once throws off the placenta, and lodges it in the upper part of the vagina. When this is the case, the presence of the placenta in the vagina, and the irritation of the surface, from which the placenta has been torn, are generally sufficient to ensure, by reflex action, the contraction of the uterus, and to prevent hæmorrhage. The maternal emotions also tend to accomplish this end. The sound of the child's voice affects the action of the uterus. If the placenta does not separate immediately, slight irritation through the loose abdominal walls, or gentle traction of the cord, is sufficient to cause its expulsion. Denman recommended that the placental mass should be allowed to remain a considerable time in the vagina. He supposed that coagulation of the blood, poured out at the moment of the separation of the placenta, was thus favoured, and after-pains diminished as a consequence. But this plan would also act by exciting reflex action, and the permanent contraction of the uterus. At this time a bandage is applied to the abdomen, and furnishes another guarantee against hæmorrhage.

The uterus has now lost its great excitor, by the delivery of the foetus, but it is necessary that the uterus should be stimulated for a considerable time in order to promote its return as nearly as possible to its pre-impregnated state. This is provided for in nature. The stomach has an intimate reflex connexion with the uterus at all times, but immediately after delivery this is very much increased; everything the patient drinks now excites uterine contractions. The reflex connexion between the mamma and uterus is increased to a still greater degree. The mere sight of the child will sometimes suffice to create the sensation of "the draught" in the breasts, and this re-acts upon the uterus. Drinking fluids also excites the draught, and thus the stomach exerts an indirect action on the uterus besides its proper reflex action. Still more powerful is the act of suckling the child; distinct uterine action is excited on each occasion, and when after-pains are present, a distinct pain is regularly produced every time the infant is applied to the breast. These different sources of excitation continue for some time after delivery, and are sufficient to restore the uterus to the size natural to the unimpregnated state in women who have borne children.

No one can refrain from admiring the successive order in which various excitor powers come into operation during the progress of labour. First, according to my belief, the ovaria excite the uterus, while this organ is defended from the irritation of the foetus by the liquor amnii, a fluid of its own temperature, a medium least of all capable of exciting that reflex action of which the uterus is so susceptible. Next, the head of the child is brought in apposition with the os uteri, shielded, however, in some measure, by the liquor amnii, until the os is sufficiently dilated to permit it to pass; then, the naked head and body of the child come in contact with the highly excitor surface of the vagina and the os externum successively. After the foetus has been expelled, the placenta takes up the train of excitation, and this is followed by the gastric and mammary succession of stimulus and action. Not less extraordinary is the gradual augmentation of motor action, from the simple equable contraction of the uterus the day or two before labour, to the grand combination of muscular actions, which marks the final throes that expel the child.

The motor power of the uterus itself, the number of motor organs involved as auxiliaries, and the different forms of muscular action brought into action during its progress, mark the act of parturition as the most comprehensive of all the motor functions of the animal economy. Taking muscular irritability as the basis, we have reflex action, emotion, and volition, every power, in fact, which exists, whether for the execution of contraction or dilatation, all extensively and simultaneously engaged; the end of all being the safe accomplishment of delivery. Well might the philosophic Denman exclaim—"Instead, therefore, of despairing, and thinking they are abandoned in the hour of their distress, all women should

believe, and find comfort in the reflection, that they are at those times under the peculiar care of Providence, and that their safety in childbirth is ensured by more numerous and powerful resources than under any other circumstances, though to appearance less dangerous."

ON THE TREATMENT OF CHRONIC DISEASES OF THE SKIN.

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PITYRIASIS, the third genus in the order squamæ, exists in two forms; the one is a trifling disease, appearing chiefly on the heads of infants, (dandruff,) and generally disappearing spontaneously. It rarely comes under medical treatment. The other, as described by Rayer, is a formidable and often fatal disease, being usually complicated with internal inflammation of a highly dangerous character. No English author with whom the writer is acquainted has described this severe variety.

Ichthyosis, the fourth genus in this order, is a very rare disease, and writers give very contradictory accounts of it. The author has never seen it, but he once saw a well-marked case of psoriasis diffusa, (on a portion of the lower extremity of a gentleman,) which—so said the patient—was pronounced by a hospital surgeon of high repute, "a case of fish-skin disease." The treatment was as enlightened as the diagnosis. The patient was in possession of a prescription, in the well-known handwriting of the same hospital functionary, directing certain articles to be made into pills, with "*Liquoris potassæ arsenitis, quantum sufficit*!" No man can be expected to possess a perfect and practical knowledge of every branch of the profession, but a decent share of humanity (in the absence of common sense) might suggest the propriety of declining to prescribe in certain cases, in preference to playing such tricks as this. This ridiculous story would not have been related, but from the conviction of the writer—a conviction strengthened from sources extraneous to the story itself—that the pupils of this gentleman, who are and have been numerous, (for he is a favourite teacher and a gentlemanly man,) have, to a certain extent, imbibed his own ideas on this subject; and accordingly, whenever they meet with a case of psoriasis, set it down, with the utmost simplicity, ichthyosis. The two diseases bear no more resemblance to each other than variola and urticaria.

ORDER III.—EXANTHEMATA.

Of the six genera in this order, four—namely, rubeola, scarlatina, roseola, and erythema—are essentially acute in character, and limited in duration. There remain, therefore, for our consideration, only two genera—urticaria and purpura.

Urticaria (nettle rash) is a common and well-known affection of the skin. It is usually preceded by pain, oppression, or a sense of weight "like a lump of lead" at the scrobiculus cordis, and often results from eating indigestible articles. Shell-fish occasion it in some persons, and all kinds of fish in others. It is sometimes severe in character, and accompanied with alarming constitutional disturbance. This is the acute form, which requires an emetic, followed by purgatives.

There is, however, a chronic form of urticaria, in which, whenever the skin is warm, it tingles unpleasantly; and isolated white elevations, like the wheals produced by the stinging-nettle, surrounded by a finely-shaded blush, (the form of which is generally destroyed by the finger-nails of the patient,) are to be seen on every part of the body which is covered by the clothes, and occasionally in the neck, face, and other parts where the skin is thin. These wheals will appear and disappear three or four times a day, and may annoy the patient for months or years together.

If this disease exist in an idiopathic form, and cannot be traced to disorder in the digestive organs, or to a febrile condition of the system, it will yield to arsenical treatment, like other affections of the skin; but patients will often endure it for a long time without applying for medical aid, and can seldom be prevailed upon to take a long course of medicine for its cure. Of this trifling disease the writer has recorded no cases, but he has never found arsenic fail when fairly tried under favourable circumstances. The disease is common in children, who usually outgrow it.

PURPURA.

"Purpura, an efflorescence consisting of small, distinct, purple specks and patches, attended with general debility, but always with fever—not contagious." Such is Willan's definition of purpura; but it is now well known that neither "general debility" nor "fever" are necessary characteristics