Notes on 'uterine polarity' / by Francis Henry Champneys.

NOTES

ON

"UTERINE POLARITY."

BY

FRANCIS HENRY CHAMPNEYS,

M.A., M.B. (OXON.), M.R.C.P.

MEDICAL REGISTRAR TO ST. BARTHOLOMEW'S HOSPITAL; PHYSICIAN TO THE OUT-PATIENTS AT THE SAMARITAN AND QUEEN CHARLOTTE'S HOSPITALS.

Reprinted from "The Obstetrical Journal" for January, 1880.

LONDON:

PRINTED BY BALLANTYNE, HANSON & CO.

CHANDOS STREET, WEST STRAND.

NOTES ON "UTERINE POLARITY."

AT the beginning of this century a Paper appeared in Reil's *Archiv für Physiologie* (Band vii. Heft 3, p. 415. A.D. 1807), from the pen of Reil, under the following title:— "On the Polar Divergence of the Original Natural Forces in the Womb at the Time of Pregnancy, and their Mutual Exchange at the Time of Labour, as a Contribution to the Physiology of Pregnancy and Labour,"*—so remarkable and so important in its bearings, that it seems to me advisable to call attention to it.

I do this with the more confidence from the fact that nothing equally good has appeared subsequently on the same subject, that Reil's Paper seems to be unknown or forgotten, and that without some such theory, not only the conditions of pregnancy and parturition, but those of many other uterine states are unintelligible. I have seen no reference to Reil's Paper in any of the text-books, nor had I ever heard of it till it was brought under my notice some months ago.

I shall therefore not further apologise for translating large portions of it, omitting such parts as are purely fanciful, and shall add some few comments, together with one or two illustrative cases.

"The forces (of the unimpregnated uterus) stand in

* "Ueber das polarische Auseinanderweichen der ursprünglichen Naturkräftein der Gebärmutter zur Zeit der Schwangerschaft und deren Umtäuschung zur Zeit der Geburt, als Beytrag zur Physiologie der Schwangerschaft und Geburt." Von Prof. Reil.

equipoise ; they are not widely separated towards different poles ; the contractile force is in excess, and is evenly divided through the whole mass. Together with impregnation, however, the expansive force obtains the advantage, first, in the fundus, from thence farther and farther through the whole substance, drives the contractile force towards the opposite pole, until this latter, driven towards the extreme point, springs over from the neck to the fundus, and at this moment gives the signal for the commencement of parturition. Moreover, all these circumstances of the female sexual organs, however different they may appear to be, vary from one another, not in themselves, but only in their mutual relation. In all there is the same contraction and expansion, and the different grades of vitality consist only in this, that partly their quantitative relation changes and one gets the advantage over the other, partly in this that they separate themselves and retreat towards the opposite poles of the uterus.

" Immediately with impregnation the indifference in the substratum of the fundamental forces of the uterus is suspended. The expansive force rises in comparison with contraction ; at the same time the two forces separate themselves by dichotomy, the former occupies the fundus, the latter is driven back towards the neck, and the axis of the uterus resembles a magnetic line with different poles. The dynamic metamorphosis once begun lasts throughout the course of the pregnancy, and determines its whole development in the different stages through which it advances from its beginning to its end.

" The expansion begins in the focus of the fundus, and extends thence into greater and greater circles through the whole fundus, body, and portio vaginalis as far as the neck, where it reaches the maximum both of its intensity and of the extent of its growth. In proportion as this occurs, the contractile force, more and more pressed back from the fundus towards the opposite pole, takes refuge in the extreme point of the neck, until it is even here overcome by expansion, which mostly happens with one bound and in a moment of time, as I shall

show below by examples. At this moment follows the change of the poles in the magnetic line ; contraction leaps over, as in an over-charged jar, from the neck of the uterus to its fundus, possesses itself of the same focus in the fundus as that from which, at the beginning of pregnancy, the expansion started, takes here a firm foot-hold, proceeds from this point periodically and alternately with expansion through the whole substance of the uterus, in which now the opposite dynamical state obtains ; the plus of contraction lies at the fundus and the plus of expansion at the neck, and on the whole contraction prevails over expansion. This inner state appears outwardly in the shape of the labour pains. This cycle of metamorphoses through which the fundamental forces run, in the constant change of their relations, is completed in a space of nine months, and the moment in which expansion overpowers contraction, even in the neck, and the latter leaps over again to the fundus, is the physiological separation between pregnancy and labour. From this moment forward contraction increases in proportion to expansion in intensity and extensiveness in space and time ; it expands more and more from the fundus through the body to the neck, returns at shorter and shorter intervals, remains longer and is stronger in itself, until the moment of the completion of the delivery. The formation of the pains follows along with this from their commencement to their end. After the end of the labour these oscillations also, which originate from the antagonism of both forces, cease ; contraction possesses itself again of the whole substance of the uterus, and restores the expanded and relaxed uterus, in a space of three months, again to its original volume.

"Through these metamorphoses in the quantitative fundamental relation of the original forces of the uterus, and especially through their polar divergence in opposite directions and through the exchange of poles at the time of labour, comes to pass that remarkable antagonism between the upper and lower part of the uterus, upon which is founded all possibility of a pregnancy and labour. In pregnancy begins the preponderating expansion from the

fundus, and advances with an ever-increasing minus of contraction to the neck, where contraction fastens longest and most obstinately. Hence the space for the reception of the embryo in the upper part and its retention in the cavity of the uterus during pregnancy. At the time of labour, through the exchange of the poles, the reverse relation commences. Hence the evacuation of the embryo. From conception to the time of labour the conditions of pregnancy constantly become weaker till they arrive at zero. At this moment the first antagonism is annulled, the opposite begins, the pregnancy must cease, and the time of labour commence" (p. 415).

The statement above, that it is contraction that restores the uterus after labour to its original volume in a space of three months is not strictly correct; the amount of tissue in the uterine substance is the same immediately after, as it was immediately before, delivery, excluding, of course the fœtus, placenta, membranes, and also the blood in the uterine vessels, for which there is less room in the contracted uterus. Still, if we acknowledge that degeneration, absorption and excretion play the principal part in reducing the puerperal uterus, in three months, to one twenty-fourth part of its weight (Meckel), we cannot but insist, on Reil's part, on the share taken by uterine contraction in reducing the blood-supply and thus promoting that degeneration.

The whole passage cannot, of course, be taken as a complete exposition of the causes of the enlargement of the uterus, but sets forth most graphically one important condition obtaining during pregnancy and reversed at the time of labour.

"If they (the lips of the os uteri) are still thick and hard, the labour may still be delayed, even if the os uteri is already open; on the other hand, this follows certainly in a few days if the os uteri is quite soft and obliterated.

"A young and delicate person had already aborted twice, and in the third month of her third pregnancy had again a loss of blood which continued eight days long, without pains, and brought her to the brink of the grave. The neck of the

womb was long, hard, the os closed, and the ostium vaginæ so narrow that hardly two fingers, and those not without pain, entered. All at once, on the eighth day, after the use of strong irritants, the first weak pains began. At the same moment I examined her; I was able to penetrate with the whole hand into the vagina without pain, and found the cervix uteri soft and expansible, where, a moment before, all had been still hard and inexpansible. The commencement of the pains was the moment in which the polarity had changed round, the contractile force had removed from the neck to the fundus, and the expansion from the fundus to the neck" (p. 425).

The relaxation of the vagina during the progress of pregnancy is well known; its rapid relaxation under the influence of abortion, in the third month, is not so often described. The expansion of the vagina for parturition is not essentially a passive dilatation.

In some of the lower animals a similar active relaxation takes place at the time of heat, the vagina being penetrable only at these times, which sometimes, curiously enough, follow delivery closely, and do not return till after a long interval.

"The portio vaginalis and the neck of the womb develop prematurely, become relaxed, and the contractile force displaced from this pole changes to the fundus. Hence one can also frequently predict, with certainty, from the relaxation of the portio vaginalis, premature labour and the time thereof" (p. 427).

"The antagonism between fundus and neck, during labour, is the direct converse of that which obtains at the time of pregnancy" (p. 446).

"At times contraction fixes its focus at the time of labour in the neck of the womb, instead of in the fundus, and the former is by this means spasmodically contracted.

"In other cases every point in the whole surface of the uterine walls becomes at once the focus of contraction; every part draws itself together with equal strength and without intermission, as in *rigor mortis*. Hence the pressing of all

points of the circumference towards the central point of the uterine cavity, and the *incarceration of its contents, embryo, placenta, &c.* This occurrence is apt to arise in the case of a transversely lying embryo which, perhaps, excites it by its pressure. At the moment in which the embryo is cut through in the middle and collapses, both forces separate from each other, each towards its own pole, so that one can undertake, without any difficulty, version which was before impossible. At times the focus forms eccentrically, somewhere in the side walls of the womb, or several centres mutually opposed in their direction arise, whence come local contractions, divisions of the womb into two or more cavities, *incarceration of the placenta*, false, fruitless, and highly-painful labour-pains. In a normal condition the walls of the womb contract equally over the fœtus as over a cylinder, upwards towards the middle point of the fundus. The neck yields because expansion in it prevails in proportion as at the opposite contraction predominates. The labour-pain is either not painful at all, or associated with a bearable feeling of pressure, and the labouring woman feels rather refreshed than wearied. On the other hand, those false pains are intolerably painful, give rise to faintings and convulsions, do not contribute towards delivery, and the labouring woman feels, in the intervals, tired and in a highly-uncomfortable condition. Generally an unusual presentation is there, which one can already predict from these pains, even if it is still impossible to discover it by touch. The wrong position is again ordinarily caused by other and earlier anomalies. Hence it comes, that where an abnormality is discovered, several are generally found together. I saw lately, in a labouring woman, the placenta in the left side, the child with its back turned towards the right side, the buttocks below, the womb directly in the middle and so contracted transversely that one could only, with difficulty, penetrate beyond the stricture to the ends of the feet. After the birth the placenta was encapsuled, was adherent, and at the place a diseased spot of the uterus, which was most likely the common source of all these anomalies.

"After the same laws arise the *false after-pains*, except those which expel the after-birth; they are local, erratic, streaky contractions, meeting in contradictory directions, which are generally the results of an asthenic life of the womb, and can be therefore removed by opium and warm vinous fomentations. So are formed everywhere, in the heart, *stomach*, *intestinal canal*, abnormal foci of contraction, which excite, through their wrong direction, horrible pains, especially in the intestinal canal.

"What is called an oblique position of the womb, in which the os uteri does not stand in the axis of the pelvis, expands unequally and only on one side, and the bag of membranes has an oblique presentation, arises probably not from mechanical causes, unequal weight of the womb, relaxation of the abdominal muscles, and so forth, but from the formation eccentrically, and somewhere in the side wall of the uterus or in one or the other of the round ligaments, of a focus, to which its fundus inclines and where generally the placenta is fastened. Hence one is not generally in a position to give the womb a direction parallel with the axis of the pelvis, by the posture of the labouring woman, as one would think if the obliquity were merely mechanical and not vital.

"At times, generally immediately, or even later, eight or twelve days after delivery, uterine hæmorrhages arise, in which, contrary to the rule, the womb has either not contracted at all or has relaxed again. The expansion is general or local, in the latter case at the fundus or the portio vaginalis. If the fundus is expanded and the neck contracted, the blood which has been poured out becomes encapsuled in the uterine cavity. Weakness is the usual cause of this condition, which is therefore apt to follow strong pains, quick emptying of the uterus, great distension of the uterus from excess of liquor amnii, twin-births, &c. Every mechanical and chemical irritation, and especially the positive pole of the galvanic battery, removes the excessive expansion and stops the flow of blood. One introduces a zinc pole bent in the form of the segment of a circle into the uterus, up to the fundus, places

a simularly bent silver pole on the navel, and brings into contact the ends of them which lie opposite each other" (p. 458).

He then adds, as instances, spasm of the neck of the bladder and of the rectum, procidentia uteri, "die Ruhr" (? diarrhœa), retention and incontinence of urine, and spasmodic (Einklemmung) strangulation of ruptures.

In the above extract it will be seen that Reil refers incarceration of the uterine contents either to general uterine tetanus or to partial and eccentric contractions. To this question we shall only refer in passing, merely remarking that cases of so-called hour-glass contraction, with incarceration of the undetached and not morbidly adherent placenta, would seem to forbid the supposition of uterine contraction in the upper uterine segment, at least at or about the placental site. (For remarks on the fallacy of taking uterine hardness, felt externally, for a proof of real uterine contraction, see Matthews Duncan's "Mechanism of Parturition," 1875, p. 420.)

The difference between the effect of regular normal and irregular abnormal pains on the general well-being of the parturient woman comes, probably, within the observation of all, though "faintings and convulsions" can hardly be said to be produced by the latter. Still conditions, no doubt, do frequently exist in which these are associated with irregular uterine action.

Reil's remarks in this paragraph on false after-pains are most wise. It will be seen that he makes no mention of clots, remains of decidua, &c., as being essential to their production, but compares them definitely to intestinal colic, and refers them to local, erratic, streaky, contradictory contractions depending on abnormal uterine conditions, and, like intestinal colic, to be removed by warmth, cordials, or opiates.

His comments on the vital nature of obliquity of the uterus are confirmed by the fact that such obliquity persists during a pain, which may be said to stereotype its real shape and position apart from decubitus.

The following case seems to me to illustrate Reil's theory :—

Mrs. S., aged twenty-three (4-para) (altogether out of her reckoning, as she suckles one child till advanced in pregnancy with the next), expected to be confined in June, 1878. This did not, however, take place. On Sept. 5 she reached to hang some curtains up. At midnight sudden severe flooding took place—" half a pailful." I was sent for and arrived, Sept. 6, at 2.30 A.M.

Patient faint, respiration sighing, pulse fair. Head presenting, os size of a shilling, very thick and rigid, almost like an ivory ring covered with mucous membrane, not admitting more than two fingers, three fingers could be inserted with difficulty half-way. Head above pelvic brim, membranes intact, no placenta to be felt. Pains short, rare, ineffectual, disorderly ; uterus not hard between the pains.

Although she was not then bleeding, her state seemed to me to indicate delivery without delay. I therefore inserted a Barnes' dilator, and, holding it *in situ*, dilated it ; it produced no effect whatever on the cervix, though repeatedly inserted, slipping out or in.

I decided to attempt to turn by the bi-polar method. Introducing two fingers, I succeeded in doing so with some difficulty, leaving the membranes intact.

The os remained of the same size and rigidity, and some considerable difficulty was experienced in getting the foot (which was much smaller than the average size of a full-time fœtal foot) endwise through it ; but, this being accomplished, and the leg brought down into the vagina, the os was felt to become rapidly softer and more expanded, the half breech dilated it without difficulty, and the extraction followed easily. During turning a large clot was felt between the uterine wall and membranes, some three inches from the os externum. The placenta followed easily, the uterus contracted efficiently, and the patient did well.

The question, What caused the rapid dilatation of the os ? is, I think, only to be answered by Reil's theory. In his language detachment of part of the placenta (which,

I suppose, was the cause of the bleeding, and which I have several times seen to follow work which required reaching to a height) excited contractions which were not rhythmically associated with cervical dilatation, but were "local, erratic, streaky, and contradictory, the results of uterine asthenia;" contraction was still, therefore, in firm possession of the lower segment, and contraction at the fundus and contraction at the cervix stood in stubborn mutual opposition. By bringing a leg into the vagina I reduced the uterine contents, which enabled the fundus to effect a moving normal contraction, the rhythm was restored, contraction possessed itself of the fundus, relaxation of the cervix, and the delivery followed naturally. I asked myself whether the same result would have followed rupture of the membranes and evacuation of some of the liquor amnii? I think it would, as the result showed; but as this could not have been known beforehand, it was better to retain the liquor amnii.

In the case of uterine hæmorrhage with conditions of fundal relaxation and cervical contraction, Reil might have added that dilatation of the cervix is often sufficient to produce contraction of the fundus and consequent arrest of the hæmorrhage. This procedure is familiar to all obstetricians, and forms the basis of the practice of the use of tents in cases of uterine hæmorrhage, but I have nowhere seen an explanation of its action, with one exception.

Savage, in his work on "The Female Pelvic Organs," 1870, says: "There is a functional antagonism between the uterine cervix and the uterine body to this extent, at least—that contractility in the latter is powerfully promoted by forcible dilatation of the former. Uterine hæmorrhage and the vitality of soft intra-parietal hyperplasms may often be beneficially, sometimes signally, controlled by incisions destroying the future contractility of the cervix."

Reil adds (p. 462), as instances of the operation of the same principle: "Tenesmus of the neck of the bladder and of the rectum, prolapsus uteri ('das Niederstossen der Gebärmutter'), diarrhœa, retention and incontinence of urine, and strangulation of a hernia." Many of these are fanciful, but Reil seems to have been on the verge of enunciating some

very remarkable theories. For instance, had he cited *inversio*, instead of procidentia uteri, he would have been absolutely correct, according to the latest scientific views, which regard that state as due to fundal atony, with contraction lower down. Again, we can hardly believe that Reil could have been so near to mentioning intussusception without actually naming it, and at first feel disposed to give him the benefit of the doubt when he speaks of "kramphafte Einklemmung der Brüche." But he himself forbids this by saying, in the next page: "Bey einer kramphaften Einklemmung der Brüche *mittelst des Bauchrings* ist derselbe wie im Starrkrampf zusammengezogen, und das Eingeklemmte wahrscheinlich der Reiz, der diese überwiegende Contraktion unterhält, nach Art der querliegenden Frucht."

We therefore beg to add these to his list, where they certainly belong, and to remark that inversion of the uterus is really an intussusception, and that both are the results of disturbed "polar" relations.

It is probable that too hard a line is drawn between the conditions of the impregnated and unimpregnated uterus, and that Reil's principle ought to be extended to the latter. It is probable that the unimpregnated uterus is subject to periodical contractions, especially at the menstrual period, and that polar relations exist even in it. In certain cases of hæmorrhage from the unimpregnated uterus it is well known, as stated above, that cervical dilatation cures the hæmorrhage, probably by producing fundal contraction.

The following case shows the efficacy of this treatment in a case where ergot had been given without success:—

F. F., aged twenty-one, married two years, never pregnant. For more than two years (before her marriage) she has been subject to too frequent menstruation, which returns every three weeks and lasts a week, leaving her only two weeks clear. This has not been worse since marriage. During the first two days of the flow she has much pain above the left Poupart's ligament, a slight cough at the periods only, and a slight white discharge in the intervals. Nothing amiss could be discovered by finger, speculum, or sound.

She then took a drachm of liquid extract of ergot three times a day. The two next periods returned at the same interval of three weeks, and lasted seven and eight days respectively, though the quantity was slightly less. The third period, however, was excessive, and I resolved to dilate the cervix with bougies. I passed the series into the uterus up to No. 18 size, and continued the ergot.

After this she was clear three weeks, and then had a natural period, which lasted only four days. She then ceased to attend, but called on me five months later to say that she had remained quite well, that her periods recurred every month, lasted four or five days, were not profuse, and not painful, and that she had no discharge in the intervals. Her appearance was that of perfect health.

Whatever was the cause of the frequent menstruation in this case, it seems that dilatation of the cervix altered the conditions and restored the normal rhythm, I believe by the operation of Reil's principle.

Reil has claimed false after-pains for the domain of disturbed uterine polarity ; Dr. Matthews Duncan has insisted on the analogy between after-pains and a variety of dysmenorrhœa to which he gives the name "spasmodic." These cases are well marked ; the pain generally precedes the flow, often by two days, it is colicky in character, often severe in intensity, is situated in the lower part of the hypogastrium (in the uterus itself), and is relieved by the flow. The case is sometimes cured at one sitting, with a bougie which reproduces the self-same colicky pains as are felt at the period. These cases are sometimes included under the name "obstructive," but they should not be so classed. It is obvious that in cases where pain precedes the flow by a considerable interval, clots and dysmenorrhœal membranes must be excluded as possible causes of the pain, even if the patients were able to produce them, which is far from being the case ; and if the cases present, as they do, a well-marked family likeness, the whole class should be considered together, even where little or no interval exists between the beginning of the pain and the establishment of the flow. The fact that the bougie cures them does not prove obstruction, for in many of them a large

bougie meets with no impediment, even during the paroxysm, and a sound, as a rule, passes with ease. One characteristic of them is extreme sensitiveness of the os uteri internum; it is just this spot, and often this spot only, that is tender, and it is on passing this that the bougie produces the characteristic pain, and sometimes vomiting, where this is usual at the monthly period.

I was treating with bougies a patient suffering from this complaint; on passing the os internum great pain was produced, like that which was suffered at the period, and she began to vomit, as she often did at the menstrual time. I left the bougie *in situ* in charge of a nurse. In a few moments I heard the vomiting and indications of pain cease. On examining I found that the bougie had slipped out some little distance. On passing it up again through the os internum the pain and vomiting returned.

Instances are known in which the characteristic severe pain returns every month without any menstrual discharge whatever. Such a disease might be called "dysmenorrhœa paradoxa s. amenorrhoïca." It illustrates, by way of a paradox, the nature of the pains in spasmodic dysmenorrhœa.

The pains are colicky in character, and are probably colicky in their essential nature, depending on spasmodic, abnormal, unrhythmical, contradictory contraction of the whole uterus. They can be excited by irritation of the os internum artificially, but what relation this part of the uterus bears to their automatic production is not known.

I believe that in some cases the same pain may be excited by causes external to the uterus.

L. T., aged twenty-six, single, came to me on Nov. 5, 1878, complaining of painful micturition, and of painful and scanty menstruation, the pain occurring on the first day of the period and getting better as the flow was established. Urine clear, neutral or slightly alkaline, slight cloud of phosphates on boiling, no albumen.

On Dec. 3rd, treatment not having relieved her, I made an examination. The vesical sound caused no pain till the point was turned towards the trigone, when the pain com-

plained of was produced, and the point of the sound was felt, per vaginam, just anterior to the cervix, above the anterior *cul de sac.*

On Dec. 10 I passed a series of silver uterine bougies up to No. 13, which produced, on passing the os uteri internum, the *pain complained of on micturition.*

After this treatment she never felt the pain again while under my care. When she had remained cured of it for more than a month, I recommended her to leave and return if the pain returned.

What the conditions were which produced the pain on micturition I do not know, but I think that the pain was dysmenorrhœal in character, probably of the same nature as that of spasmodic dysmenorrhœa ; the case might be described as "dysmenorrhœa a mingendo."

I cannot help thinking that all true cases of spasmodic dysmenorrhœa ought to be classed with false after-pains, as manifestations of uterine colic, or, in other words, disturbed uterine polarity.

The treatment of this condition by bougies, when it relieves, probably does so by exciting the uterine spasm so intensely as to exhaust, for a long time, or for all time, the uterine irritability, and furnishes an instance of the principle that "familiarity breeds contempt."

Although the part played by "polarity" in uterine physiology and pathology is still obscure, its recognition seems essential to a right understanding of many processes within those domains, and its existence should not be forgotten in treatment.

If it be true that its disturbance is the essence of the pain—sometimes excruciating—of at least one form of dysmenorrhœa, what is to be said of the many violent surgical operations often performed on the uterus upon slight provocation, and having for their result profound alterations of its texture, form, and proportions ?

An organ possessing such properties as those claimed for it by Reil is surely entitled at least to our respectful forbearance.