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Evans, D. J.

ON THE ÆTIOLOGY OF THE NAUSEA AND VOMITING OF PREGNANCY.

BY

DAVID JAMES EVANS, M.D.,

MONTREAL, CANADA.

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ON THE ÆTIOLOGY OF THE NAUSEA AND VOMITING OF PREGNANCY.*

By David James Evans, M.D.,
Lecturer in Obstetrics, McGill University, Montreal, Canada; Fellow of the Obstetrical Society, London, England.

The purpose of this preliminary paper is to advance a theory, which seems to be founded on sound physiological grounds, of the causation of the nausea and vomiting of pregnancy.

In a brief review of the somewhat copious recent literature of the subject I have been unable to find anything which leads me to think that the theory which I wish to advance is other than new.

The vomiting of pregnancy is usually divided into two classes, namely: the mild or physiological; and the severe or pathological, hyperemesis gravidarum. The mild form, with which this paper particularly has to deal, occurs in the vast majority of cases of pregnancy.

In a brief paper it is impossible to refer to the various theories which have been advanced from time to time in explanation of the origin of this vomiting of pregnancy. That there exists in the pregnant woman a condition of exaltation of nervous tension all are agreed. A few consider that the origin lies in direct irritation of the medullary centers by toxic material circulating in the maternal blood. Others explain the irritation as originating peripherally, either in uterine contractions or in abnormal states of the gastro-enteric tract.

Exactly how conditions about the uterus give rise to peripheral irritation has been variously explained. Mechanical pressure of the enlarging uterus on the nerves of the pelvic ganglion; stretching of the muscle fibers of the uterus causing pressure on the nerves; versions and flexions of the pregnant organ; ovarian irritation from uterine pressure; diseased conditions, as endrometritis, cellulitis, endocervicitis, etc., have all been advanced as factors in the production of this irritation. Gastric ulcer, gastritis and various abnormal conditions of the large and small bowel have also been advanced as possible sources of the peripheral irritation.

Dirmoser,[1] as the result of a careful examination of the urine in six cases of hyperemesis gravidarum, comes to the conclusion that intoxication is the cause of the severe symptoms. As to the production of

* Read before the Montreal Med.-Chir. Society, Nov. 10, 1899.

the intoxication,[1] he advances the following elaborate hypothesis: "Through the increase in size of the uterus the motor nerves of that organ, the sympathetic and the vagus, are at once mechanically irritated. They, being irritated, bring about respectively contractions of the uterus and of the stomach. Irritation of the vagus increases, however, the secretion of the gastric juice, and also the mucous production, so that the alkaline mucus frequently neutralizes the gastric juice, which is often observed in cases of hyperemesis. These changes form a predisposition to the formation of toxines, which is still more increased by the atony of the whole intestinal tract, which is present in all severe cases." Dirmoser thus considers that the uterine contractions are the result of irritation due to mechanical pressure of the enlarged uterus upon the motor nerves of that organ, and that the contractions so produced are evidently pathological.

I cannot do better than quote verbatim the summary of the present views as to the explanation of vomitus gravidarum which is given in *Progressive Medicine* for September, 1899.[2]

"The possible ways of explaining vomitus gravidarum are: (*a*) Direct vomiting may be produced by an abnormal condition of the vomiting center, due either to the irritating effects of chemical substances, toxines, etc., circulating in the blood, or to nutritional changes caused by variations in blood pressure in the medulla, or to other circulatory changes. (*b*) Reflex vomiting may be produced by sufficiently powerful impulses sent from the genital tract, causing an irritation of the vomiting center. (*c*) Vomiting may be produced by a combination of influences affecting the vomiting center both directly and reflexly. (*d*) The psycopathical factor may be important, as in the vomiting of hysteria.

"We must assume that in two-thirds of all cases of pregnancy there exists an increased irritability of the medullary centers, due wholly or in part to one or both of these two factors: (*a*) Nutritional changes resulting from circulatory disturbances; (*b*) poisoning from toxic elements circulating in the blood. We must further assume that this abnormally irritable vomiting center is acted upon by afferent impulses sent from one or more of a variety of peripheral sources. Among the most important causes of reflex irritation are an incarcerated retroflexed uterus, abnormal adhesions of the uterus, pathological changes in the uterine wall resulting from endometritis, pelvic congestion, constipation, gastritis, etc. To these sources of afferent impulses we must add the psycopathic or hysterical condition, which is of especial importance in the more serious cases."

A brief consideration at this point of some of the more important conditions which are present in the gravid uterus will make my further remarks more intelligible. Tarnier has said, "All the properties of the gravid uterus exist in a rudimentary state in the nulliparous woman, and gestation only exalts them." Pajot has expressed this by saying, "Pregnancy does not create any new properties."

The principal properties possessed by the uterus are, sensibility, irritability, and contractility.

The *sensitiveness* of the non-gravid organ to pressure is easily demonstrated in making the bimanual examination. Pain is frequently complained of when the uterine sound is inserted. That this sensitiveness is increased in pregnancy is apparent to any one who has practised abdominal palpitation for diagnosis of the fœtal position. The manual pressure exerted in expressing the placenta frequently gives rise to severe pain. Women occasionally complain of uterine tenderness, especially those cases where the liquor amnii is deficient and the fœtus exerts direct pressure on the uterine wall.

The *irritability* of the uterus is frequently markedly increased as the result of pregnancy. This fact is well known even to the laity, who not infrequently make use of their knowledge to induce abortion by introducing foreign bodies into the vagina to set up powerful uterine contractions.

The *contractility* of the uterus is its most important property. Tarnier and Chantreuil[3] state that the uterus possesses the power of contracting even in a state of vacuity, citing by way of example that it may be noted in certain women at the period of menstruation, especially in cases of dysmenorrhœa. It favors the expulsion of clots and débris and is probably the origin of the severe cramp-like pains so often complained of by women at these periods. They state very strongly that these contractions of the uterus occur at regular intervals throughout the whole period of pregnancy.

Hirst[4], Davis and others also draw attention to the fact that uterine contractions occur regularly throughout the whole period of pregnancy, and Hirst states that during pregnancy the contractility is always most marked at the menstrual epoch, hence the frequency of abortion at these times. After the fourth month these uterine contractions are manifest in placing the hand upon the abdomen over the fundus. The uterus can be felt hardening under the hand. In the earlier months these contractions can easily be made out by the bimanual method, and are frequently made use of in diagnosing the fact of pregnancy when the uterus is found to be enlarged.

Contractility is more markedly developed in the muscle cells of the body of the uterus, particularly towards the fundus, while it is less pronounced in the cervix. The cervix seems to be in a state of tonic spasm, while the contractions of the uterus are clonic. That this contractility of the uterus is independent of the will and yet capable of being affected by the emotions, all are aware. Uterine contractions may be set up reflexly by irritation of the breasts, and particularly of the nipples. It is probable that any powerful cutaneous irritation, as the application of heat and cold, may act in the same way.

The nerve-supply of the uterus is derived chiefly from the hypogastric and ovarian plexuses of the sympathetic system. Cohnstein[6] has shown that the uterine ganglia have to a certain extent an independent action, like the cardiac ganglia. There exists, as has been proven repeatedly, a center in the medulla oblongata which presides over the uterine contraction. Thus the uterus is provided with a nerve apparatus to preside over contraction, very similar to that of the heart.

That uterine contractions occur at more or less regular intervals throughout gestation may then be taken as proven. The question then arises, What is the purpose of these painless rhythmical contractions of the uterus?

It is very probable that by these contractions the uterine circulation is accelerated, and thus the uterus supplements to a certain extent the action of the heart throughout pregnancy. In considering the circulation of the blood in the gravid uterus the thing that probably attracts particular attention is the arrangement of the venous system. The veins, especially in the middle coat of the muscular uterine walls, are simply enormous sinuses whose inner coat alone remains, being in direct contact with the muscle-cells. Thus these uterine veins are converted into large contractile sinuses, in which, no doubt, there must occur considerable retardation of the blood flow.

If I may be permitted, I would for the purpose of illustration compare the gravid uterus to a sponge held in the hand under a flowing faucet. As the sponge becomes filled and distended with water the hand is contracted upon it, and so the sponge is squeezed and emptied more or less of the water it contains according to the force exerted by the hand in squeezing it. When the hand is relaxed, the sponge again fills up, and so on. This, I take it, is very much what takes place in the gravid uterus.

The development of the embryo and its envelopes, as well as the hyperplasia of the uterus and its lining, are accompanied with tremen-

dous chemical changes. It is certainly from the venous sinuses of the placental site that the embryo derives its chief nourishment, and into which its effete material is emptied. The ordinary circulation of the blood through the sinuses to a certain extent provides for change in the supply, but owing to the retardation of the blood-current from the dilatation of these sinuses there must be a certain residuum, which, as it becomes surcharged with effete material, probably acts in some way as an irritant and stimulates the uterus to contraction and thus to a certain degree the organ may be said to empty itself.

In studying two cases of pregnancy with vomiting which I have attended recently, my attention was arrested by certain phenomena which seemed to me to be explicable only on one hypothesis.

In the first of these cases, a primipara, æt. 40, nausea and salivation occurred throughout the whole period of gestation. At intervals the vomiting was extremely severe, at one period the prostration resulting was so intense as to make it seem probable that the pregnancy would have to be terminated by the induction of abortion. I noticed that the severer attacks of vomiting occurred at certain intervals, which, on questioning the patient, I found corresponded to the menstrual epoch. On one occasion I precipitated a severe attack of vomiting when examining the breasts; on another a vaginal examination produced the same result, though on both occasions the patient had been fairly well for several days previous.

In the second case, also a primipara, the patient complained that her breasts were excessively tender, particularly the left, and on my examining this breast the patient was seized with a severe attack of vomiting A vaginal examination produced the same result. The uterus was found to be unusually sensitive, and the left ovary was very tender. This patient had previously suffered from dysmenorrhœa, the pain being chiefly located in the left side. While talking with this patient I noticed that the nausea occurred in paroxysms, separated by a considerable interval, in which she said she felt perfectly comfortable. The patient, as long as she was kept quiet, either on a lounge or in bed, rarely vomited, though she still suffered from paroxysms of nausea. She noticed that after walking about the paroxysms occurred more frequently, and very often terminating in retching.

The hypothesis which to my mind affords the best explanation of the phenomena observed in the two cases mentioned is that rhythmical uterine contractions were the primary cause of the reflex irritation which resulted in paroxysmal nausea and vomiting.

In the first case, where the attacks of vomiting were more marked

during the menstrual epochs, the uterine contractions were probably accentuated, and at the same time the general nervous tension was exalted, hence the increased severity of the symptoms at these periods My examinations in both cases acted by increasing the uterine contractions and thus precipitated the paroxysms.

The theory which I wish to advance is that the essential exciting cause of the nausea and vomiting of pregnancy is frequently the physiological contraction of the muscular fibers of the gravid uterus.

The contractions of the non-gravid uterus which follow the introduction of the uterine sound not infrequently result in reflexly inducing nausea and vomiting. Intra-uterine applications are frequently followed by cramp-like pains, which are associated with nausea and vomiting. In dysmenorrhœa nausea and vomiting sometimes occur, the explanation being that the effort of the uterus to expel clots and débris reflexly irritates the vomiting center in the medulla. Giles[1] has noted that in the primipara there is a close and constant connection between the sickness of pregnancy and previous dysmenorrhœa. Vomiting is frequently noted in the first stage of labor, and usually occurs at the acme of uterine contraction.

The over-distended bladder, in its effort to contract, not infrequently reflexly induces nausea; similarly the stomach sets up the same reflex. In ileus an analogous reflex action occurs. Appendicular colic is frequently associated with nausea and vomiting.

Thus we see that any hollow viscus in contracting may set up reflex nausea and vomiting.

The fact that the paroxysms of nausea occur most frequently on first assuming the erect position in the morning has led the laity to apply the term "morning sickness" to this condition. It has also been noted that if the patient, before rising, partakes of a light breakfast, the sickness is not so apt to occur.

"Morning sickness" is, I think, susceptible of explanation: There is probably more or less of an accumulation of effete material in the maternal blood in the morning, which leads to increased irritability of the nervous centers. The effect of assuming an erect position is to bring about a determination of blood to the pelvis. This engorgement of the pelvic circulation probably leads to more energetic uterine contraction, which, acting reflexly upon the center, produces nausea and vomiting. When food is taken before rising it is probable that considerable blood is determined to the stomach, hence less will find its way to the pelvis when the patient stands erect, so that the uterine

contractions are apt to be less vigorous than when the patient rises fasting.

It is probable that the beneficial effects of nerve-sedatives in the treatment of this distressing condition are obtained not so much by inhibiting the uterine contractions as by soothing the irritable nervous system and thus controlling the reflex.

I would summarize my conclusions as follows:

1. There exists more or less of a rhythm in the paroxysms of nausea and vomiting in pregnancy.

2. There must also exist a rhythmical exciting cause for these paroxysms.

3. There is a rhythm in the contractions of the uterus which occur throughout pregnancy.

4. The essential exciting cause of the paroxysms of nausea and vomiting of pregnancy is frequently the physiological contraction of the muscular fibers of the uterus.

Bibliography.

[1] Dirmoser, *Wiener Med. Wochenschr.*, Aug., 1897.
[2] "Progressive Medicine," Vol. III., 1899.
[3] Tarnier et Chantreuil, "Traite de l'art des Accouch.," 1888.
[4] Hirst, "Text-Book of Obstetrics," 1898.
[5] Dickenson, "American Text-Book of Obstetrics," 1895
[6] Cohnstein, *Arch. für Gynak.*, Bd. XVIII.
[7] Giles, *Obstetrical Transactions*, 1893.