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## THE PRIMARY MORAL PROBLEM IN PERNICIOUS VOMITING IN PREGNANCY

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In pernicious vomiting of pregnancy grave moral problems arise late in the course of the disease, concerning the physician, the father and the mother, who when interruption of pregnancy is suggested as a means of saving one life at the expense of the other, are confronted with the necessity of making a difficult choice. The preservation of the mother's life is thrown into the scales against the loss of the embryo, which, under some aspects of medical teaching, is wrongly assumed to be the *sine qua non* of the difficult situation of the mother. Although a therapeutic abortion may not save her life, and will destroy that of the embryo, the presentation of this dilemma occurs at a time when the intellect is subjected to great emotion, and has extreme difficulties in making the choice so properly indicated by the spiritual adviser. At times it is observed that in a patient who has been left free from interference or treatment as a hopeless case, or who has refused interference, or in whom treatment has been discontinued while a therapeutic abortion is debated, recovery occurs with cessation of vomiting, a gradual return of appetite and strength, and slow convalescence with delivery at term of a healthy child. Such a person with mind and body disturbed by the rack-

ing experiences that have unusually ended in recovery may ensure avoidance of pregnancy in future. Others from fear of developing the same condition may modify their habits in some similar manner. A recovery of this type, however, will appear less marvelous when the action of some common substances used in the treatment of pernicious vomiting is studied, and when it is noted that improvement began, not during, not before, but after the treatment, that had paralleled the downward course of the patient, was discontinued. It is also observed that patients with pernicious vomiting are removed from Catholic hospitals, elsewhere, and the wanted but ethically forbidden is performed under proper medical auspices.

In the discussions of the ethical problems that arise in the later stages of the disease, and which concern the necessary refusal to permit the physician to bring the innocent associate of pernicious vomiting into an environment in which it cannot survive, there has been made the unfortunate mistake of taking the disease for granted. The problem has not been accurately defined, and it has been assumed that the condition must follow the course it does, under treatment, and that it is inevitable

that the disease should menace the health of the mother. No graver error has been made. There is no necessity for the assumption that an individual properly treated for the vomiting observed early in pregnancy should progress to any stage but that of cure. If the condition of vomiting observed early in pregnancy is properly dealt with, after a study of the individual, and of the medicines indicated, relief of nausea, vomiting and acetonuria can be accomplished without the necessity of the progression of the patient, under treatment, to the stage of continued vomiting and tissue breakdown, known as pernicious vomiting. It has been too long assumed that pernicious vomiting is a disease *sui generis* and that little is known that will benefit any series of patients. This claim is made because certain highly recommended types of treatment fail, but the essential nature of their failure, the reasons for the use of such treatments, and the relations of substances used, to the phenomena which accompany their employment, have not been sufficiently studied.

If, instead of taking the disease for granted, one assumes that the primary moral problem in the early vomiting is the decision of the physician as to principle and details of treatment, then the onus is placed upon him to be thoroughly acquainted with the nature of the early vomiting and acetonuria, as well as with the

factors of treatment that may be considered responsible for the progression into the pernicious stage. If it is realized that the physician when he begins to deal with the early nausea and vomiting of pregnancy, then holds the destiny of his patient in his hands, when he considers details of treatment for the primary, always mild complaints, then the primary moral problem concerns the choice by the physician of the substances used. Some advance can be made by considering that this is the gravest problem, although perhaps not as tangible as the later necessary decision of the racked husband. One can then consider the known action of substances commonly used in the treatment of early or pernicious vomiting, and their relation to the acetonuria that parallels the downward course of the patient. Acetonuria offers a starting point for study, for it is a simple thing in the beginning, and ordinary manifestations are so easily dealt with, that there appears no necessity, even in pregnancy, for the condition of acetonaemic vomiting, so slight and mild at the onset, to continue and become the Gordian knot it now is.

We need some of the faith of Paracelsus—"Let no doctor declare this disease is incurable." "The physician must be exactly acquainted with the disease before he can know with what medicine to conquer it." It is as necessary now, as it was in von Hohenheim's era to distinguish between

the effects of treatment and the effects of disease. It has been assumed that pernicious vomiting must be, although this grave condition does not develop suddenly nor without a basis of slight nausea and vomiting. To obtain an exact definition of the condition, one must first know the effects of such a substance as sodium bicarbonate, so often used because of belief in acidosis, for when one can show that this disease is resistant because it has been approached with faulty conjectures, and that because of that faulty approach, substances used in treatment ensure that the condition of vomiting and acetonuria continues and becomes aggravated, then one gains insight into the so-called refractoriness of the disease, not previously possible, and can make firm progress. A so-called acidosis treated by alkalis with aggravation, when in reality the condition tends towards an alkalosis, aggravated by alkaline treatment, appears mystifying only to those who considered the condition an acidosis, and did not realize the injurious effects of soda and salt upon continued vomiting. To those who recognized the condition of vomiting as a tendency towards alkalosis, aggravated by salt and soda, then such treatment would appear, rather simply, as the pernicious factor. The point of view is important.

A distinction between acetonuria with vomiting treated by alkali, and acetonuria with vomit-

ing untreated with alkali is essential. For the primary departure from health observed in the pregnant patient is nausea, vomiting and acetonuria. The pernicious stage is merely continued vomiting with continued acetonuria and tissue breakdown. Should the physician, guided by false conceptions of the disease, so commonly accepted, advise and use soda (which often the patient has vainly tried without the knowledge of her adviser), believing that an acidosis is present or imminent, and fail to realize that such treatment aggravates the simple condition, and that the aggravation is not a new disease, but merely a predictable response to bad treatment, and fail to cease such treatment, then responsibility rests upon him for the production of the difficult situation that arises when under treatment, continued vomiting and tissue breakdown indicate the urgent necessity for some change, usually directed towards taking the life of the embryo.

The condition of pernicious vomiting may be described as one in which under the usual medical treatment, which commonly includes soda and salt, vomiting continues so that the pregnant patient loses weight and strength, may develop a terminal fever, after weeks or days of a subnormal temperature, with evidence of tissue breakdown as acetonuria, ending in death. Accessory signs are many, including evidence of failure of liver and kidneys, but

usually have not been related to treatment, but always to that intangible indefinable shibboleth, toxæmia.

The majority opinion holds that pernicious vomiting tends towards an acidosis, and to check this tendency treatment includes the administration of sodium bicarbonate, with or without other alkalis, at times sodium chloride in solution, with or without dextrose, signs of intolerance to salt and soda, being interpreted not as indications that the recommended medication is doing harm, but referred to the mystery of toxæmia. While some injections of saline do little or no harm to the mother, although at times associated with a dead fœtus, it has been observed that continued vomiting and continued administration of salt and soda run parallel, and by their use continued vomiting in pregnant women or others is ensured. Less accurate have been the observations of the obstetricians, usually followers of the acidosis myth, concerning the harmful effects of soda, than the physiologists, the gastroenterologists and occasionally the surgeon, who have provided evidence of the direct and positive relation of continued soda administration to acetonuria and continued vomiting.

The basis for the belief of the presence of acidosis in pernicious vomiting rests upon the hypothesis that acetonuria is the manifestation of an acidosis. Although the administration of large amounts of acetone fails to pro-

duce the manifestations of acetonæmic vomiting, and although acetonuria is characterised by an absence of signs when first encountered beyond apathy, or restlessness in children with slight vomiting, the belief in acidosis in this relation still persists, dominating to the exclusion of the observations of the relations between the effects of soda and the dosage, the theory of treatment, long after Davies, Haldane and Kennaway<sup>1</sup> showed that sodium bicarbonate, producing alkalosis, produced acetonuria in man. Yet common teaching recommends sodium bicarbonate as a major measure in the treatment of acetonuria associated with vomiting of pregnancy, and maintains the use of this ketogenic substance by various routes of administration without the realization that it is the pernicious reason for the continued vomiting and continued acetonuria attributed to toxæmia in the so-called pernicious vomiting of pregnancy.

Kelly's<sup>2</sup> study of acetonuria is of intense interest. He noted the presence of nausea, thirst and a dry red tongue, that vomiting would occur without any apparent cause, and would follow immediately the taking of anything into the mouth. In mild cases the vomit was colorless, copious and watery in character, having a foul acid odour, containing particles of semi-digested food, in severe cases dark, bile-stained, of a coffee-ground odour, and continued so till death. The pulse was in-

creased in rate, decreased in tension, and in some instances very weak. An absence of fever was notable except in severe cases before the end. Alternating with apathy there would be periods of restlessness during which the patient would require constant attention, the face would be alternately pale and flushed, at times expressive of considerable anxiety. In fatal cases consciousness was usually retained until near the last. From periods of restlessness the patients would sink into a condition of stupor or become delirious, vomiting would continue till death was near, usually heralded by cyanosis. Several patients complained of photophobia and dimness of vision. The urine in fatal cases was always diminished, at times turbid, in some instances contained albumin, but always acetone and at times diacetic. The breath showed a characteristic odour, peculiar, pungent, fleeting, suggesting chloroform or acetone.

Speaking of acetonuria, Kelly mentions that none of the theories have been thoroughly satisfactory in explaining the cause of this condition of "acid intoxication." He observed that acetonuria was present without any symptoms, later there developed apathy, restlessness and vomiting, and that in the mild instances of acetonæmic vomiting the symptoms would last for two or three days and disappear without any special treatment except the stopping of mouth feeding, and the use of nu-

trient enema. Without soda, without salt, acetonæmic vomiting was safely treated.

The interest in Kelly's study lies in the fact that it concerns children admitted to a surgical hospital service in whose urine acetone was found during their course, upon admission or after a general anæsthetic. His study has this value, that it indicates how simple is the treatment of acetonæmic vomiting if soda be not used. Referring to the administration of soda which was given by mouth, by bowel and by vein, he noted that it was impossible to state that such special treatment had any direct effect upon the condition (acetonæmic vomiting) present, and that the good results depended upon stimulation and symptomatic treatment. He noted that soda was given in thirty-grain doses until vomiting became continuous, that then soda was discontinued, and the subsequent improvement paralleled not the use of soda, but its abandonment. When soda was given in the presence of vomiting, the vomiting became continuous, and soda was given to some mild instances without any marked relief in the symptoms. By not using soda, recovery was assured, and by the use of soda (and also saline per rectum for the thirst that saline does not relieve) failure was certain. Kelly provides us with a clear picture of acetonæmic vomiting untreated with soda with recovery, treated by soda with not

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only failure but with the production of continued vomiting and acetonuria and death, which in no established essential in pregnant women differs from the continuous vomiting and acetonuria observed in children by Kelly.

Turning to De Lee<sup>3</sup> for a picture of continuous vomiting we find the same two factors, continued vomiting and acetonuria. He observes the vomiting first of food, mucus and perhaps bile, later bile-stained contents, and then large amounts of bile followed by brownish material. As the vomiting continues everything is rejected by the stomach. Thirst is intolerable, the tongue is dry and red, a fruity odour is observed in the breath. The patient is irritable and weak, fainting spells are observed. Delirium and evidence of great disturbance of the nervous system are present. The pulse is rapid, later the myocardium fails, and jaundice may appear with the same uncontrollable vomiting observed by Kelly in children with acetonuria. However, De Lee for the treatment of such instances as come under his care, does not advise sodium bicarbonate (although a limited amount is present in the Locke's solution, which he gives apparently once, and subcutaneously, not intravenously) and shows no tendency to be haunted by the ghost of acidosis. He stresses the use of carbohydrates, and restriction of fats and proteins as well as the value

of dilute hydrochloric acid. Although De Lee is not committed to a routine of salt and soda he reports his treatment has seldom failed.

The mystery of pernicious vomiting vanishes once the effects of soda as noted by Kelly are separated from the simple picture of acetonæmic vomiting. What remains are merely the primary complaints of nausea, vomiting and acetonuria observed before the soda-produced aggravation resulted in the progressive failure of the patient to the stage of continued vomiting known as pernicious vomiting of pregnancy. Continued vomiting has been observed in the gastroenterological field, where recognition of the harmful effect of soda in producing continued vomiting is recorded. Gatewood, Gaebler, Muntwyler and Myers<sup>4</sup> observe that chalk and magnesia protect against the malignant effect of soda observed in ulcer patients but do not entirely prevent the injurious effects from becoming manifest. It has occurred to the gastroenterologists that should one find a condition of repeated vomiting, one should investigate the past treatment, to find so often when organic disease other than ulcer is absent that alkalies have been continued without the realization of the harmful effects of soda. It must have occurred to many that when one treated a so-called acidosis with alkalies and the patient does not improve but becomes worse, that something is wrong. Several con-

clusions might safely have been reached in the obstetrical field as they have in the gastroenterological domain, when the increasing use of soda paralleled the increasing seriousness of the patient's condition, first that the condition was not an acidosis, secondly that it was an alkalosis, and thirdly because it was an alkalosis, it was thereby aggravated by alkaline treatment. It is forgotten that the first loss of hydrochloric acid by vomiting is the first step on the road to alkalosis, resulting later in the hypochloræmia which does not require the use of the sodium ion for treatment.

The dissenting voices of Haden and Guffey<sup>5</sup> call attention to the lowered carbon dioxide content of the blood (long known as an unsafe criterion of acidosis, for it is present also in alkalosis) and to the increased carbon dioxide capacity of the blood (a more certain sign of an alkaline tendency) and their observations made after the usual treatment had been carried on for three months without relief, and of special interest in regard to the sodium ion of a dependent œdema of feet and ankles, record the presence of not acidosis but alkalosis.

In pregnancy acetonuria develops with or before the early vomiting, without any necessity for assuming any organic basis for the disease other than carbohydrate starvation and alkaline treatment. It is certain that had sodium carbonate been used where sodium bicarbonate is employed,

the dangers would long ago have been fully appreciated, but the bicarbonate is considered so harmless that its dangers have escaped recognition. The tolerance is variable, as large doses have been given to athletes without the appearance of more serious phenomena than tetany, but in persons of poorly developed musculature the tolerance is definitely low. The tolerance appears to parallel the resistance to the fatiguing effects of exertion, but the lower the tolerance the greater the dangers, the more suddenly they become manifest, and the more difficult the task, at times impossible, as Kelly's paper shows, of dealing with the effects of tissue breakdown that follows its use. Because of acetonuria and the consequent belief in acidosis, the action of sodium bicarbonate in the production of vomiting and acetonuria is important. The decision to administer sodium bicarbonate alone or with other alkalies to a patient complaining of slight vomiting with or without acetonuria is a serious one. For without the knowledge of the production of acetonuria by sodium bicarbonate, the ordinary reaction, upon finding acetone in the urine, is to increase the dose of sodium bicarbonate, not decrease it. To then continue the use of soda in such a patient is to ensure that vomiting and acetonuria will become aggravated, and the state of continued vomiting will not be referred to soda, but termed pernicious vomiting of pregnancy. Pernicious it

is and will be only so long as salt and soda are used without insight into their influence. One can now see that the decision to use soda determines the course of the patient not towards recovery, but to that stage where later there arise the difficult problems that surround the medically advised but ethically forbidden abortion. Because of the relation of soda to the production of acetonuria, no condition in which soda has been used and in which at the same time or immediately after acetonuria is observed, and in which aggravation is noticed to parallel the use of soda, can be defined as a disease until from the various elements present indicating departures from normal health, those due to soda and similar substances have been separated. Separation of the effects of soda (producing acetonuria, continued vomiting and the other signs of failure noted) from the elements of pernicious vomiting of pregnancy leaves us with the simple condition of painless acetonæmic vomiting, prior to the stage induced by soda of great tissue breakdown. In other words, pernicious vomiting has been so, because it has not been accurately defined, and because the pernicious effects of soda have escaped attention, and because a necessary ideal of treatment has not been established.

Even in pregnancy, as well as in other individuals and at various ages including children, one will meet with the complaint, the duration of which is usually not

longer than a week, that the patient "vomits everything." Enquiry establishes that the initial attack of vomiting was slight, but that soda alone or in some advertised preparations was freely and vainly taken, with the result that the vomiting was repeated, and epigastric pain or burning not present at the onset (no organic disease having been observed in these instances), is noted. It is easy to dismiss the numbness and tingling observed by the patient in toes and fingers, as a rather definite feature of hysteria, or more hopefully when serious attention is directed to the parallel of repeated soda administration and continued vomiting to regard it as an early and significant indication of tetany. No difficulties are experienced with these patients once it is determined that soda has been used, that soda will not again be used, and that more neutral preparations such as bismuth subnitrate (a favorite of Sidney Ringer) are employed. The major problem is the recognition of the use and harm of soda, not the diagnosis of hysterical or neurotic vomiting because of the unrecognized significance of the numbness and tingling that accompanied soda and repeated vomiting, of the same import as the numbness and tingling observed by Davies, Haldane and Kennaway after the forced breathing that produced alkalosis and acetonuria.

Recently, McGowan<sup>6</sup> and his colleagues have presented other

evidence of the correctness of the viewpoint presented here, that by the proper choice of the substance with which the vomiting of pregnancy is treated, one can ensure a success not achieved by adherence to salt and soda. After common methods had failed (unstated but presumed, based upon the usual belief in acidosis) and after a period of hospital treatment where the usual injections of saline with dextrose were accompanied by a continuance of nausea and vomiting, these authors found nitroglycerin in 1/100 grain doses, three times daily, effective in relieving the distress of their patients.

The usual salt and sugar injections were given without insight into the fact that the parallel of salt treatment accompanied a continuation of nausea and vomiting. However, they did note that their patients did not improve, and turned to nitroglycerin, with success, controlling and eventually annulling the nausea and vomiting that had persisted with conventional methods. Amyl nitrite was found effective in relieving the duodenal spasm responsible for vomiting observed roentgenologically. Success was attained through abandonment of common methods, and through the employment of a simple antispasmodic, after sodium chloride had continued the condition, and common methods had failed. By not using salt and soda their results surpassed their hopes. They note that nitroglycerin late in preg-

nancy fails to relieve heartburn, for which bismuth subnitrate and attention to such factors as diet and caffeine drinks may be considered. They record the ineffectiveness of sodium bromide and corpus luteum. Without alkalies, without saline, with a simple available antispasmodic, and with no false concepts of acidosis presented, they ensured that their vomiting patients recovered and went on to term.

Although Magnus-Levy,<sup>7</sup> Davies, Haldane and Kennaway, Beumer and Soecknick<sup>8</sup> and Wigglesworth<sup>9</sup> under varying conditions and with different experimental animals including man, have established that sodium bicarbonate is capable of producing and intensifying acetonuria, the belief in the acidosis of vomiting has led to the employment of this very substance, alone or with other alkalies as a means of relieving the very condition it has been shown to produce. Acetonuria has been shown to follow the use of sodium bicarbonate in man. Yet the substance advised for the relief of acetonuria is sodium bicarbonate. So much for the belief in acetonuria as an acidosis, for Magnus-Levy observed that dilute acids, such as hydrochloric acid, checked acetonuria after it had been produced by soda. One can realize very definitely that acetonuria, associated with early or late vomiting of pregnancy or other conditions, must not be treated by soda, and that when it is treated with soda or salt and

becomes worse one need not wait long to appreciate that these substances with their aggravating influence upon continued vomiting constitute the grave reason why grave moral problems arise in pernicious vomiting, when the subsiding life of the patient calls attention to the necessity for a difficult choice. It is much simpler to have certain knowledge of the harm of soda and avoid it weeks before.

By a separation of the effects of the administration of sodium bicarbonate as observed in patients with acetonæmic vomiting, from the effects noted in patients with acetonæmic vomiting and pregnancy the conclusion is reached that the grave aspects of vomiting of pregnancy, known as pernicious vomiting, commonly treated by salt and soda but not with success, are due primarily to the use of sodium bicarbonate, given in the false belief that acetonuria is due to acidosis. Without the realization of the falseness of the concept of acidosis in vomiting of pregnancy, and of the action of sodium bicarbonate as observed by Kelly and others, this conclusion could not have been easily reached. A new and more hopeful outlook is available for patients suffering from vomiting of pregnancy, as is shown by the observations of McGowan and his

colleagues, in regard to the discard of common measures and the use of antispasmodics. By the proper employment of substances effective in relieving the simple vomiting of pregnancy, the difficult problems that arise when vomiting under treatment becomes pernicious are eliminated.

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