

DANGER-SIGNALS OF THE PREECLAMPTIC STATE.

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Read before the Brooklyn Gynecological Society, March 3, 1899.

Eclampsia occurs once in from 300 to 500 pregnancies. Statistics show that nearly one-third the mothers and one-half the children are lost. If the septic and other sequels of puerperal convulsions are taken into account the gravity of the accident is even greater. Not only is the liability to septic infection increased by the toxic condition, but post-partum hemorrhage, thrombotic affections, operative interference and injuries to the nervous system add to the loss of life and usefulness.

Yet eclampsia is conceded to be a preventable complication of pregnancy and labor. In the practice of obstetricians of special training childbed convulsions are unknown. The cause of their prevalence in general practice is not far to seek. Too little importance is attached to the supervision of the pregnant state by both physician and patient. The woman has little fear of the dan-

gers she knows not of, and the physician's duties during the period are too often neglected or conducted in a perfunctory manner.

Gestation is looked upon as a natural process which is to be left largely to its own course. Few patients if they are apparently well receive more than occasional passing attention during the entire period of pregnancy. The counsel so much needed, especially if the pregnancy be the first, is seldom imparted, no record is kept, no systematic examinations are made and urinary analyses are practised at long intervals, only in the later weeks, and are usually limited to testing for albumin. The first signs of the gathering storm are rarely brought to the notice of the physician and the opportunity for averting it is thus lost. It is for these reasons that I have ventured to bring this subject before you in the hope that the duties of the general practitioner in the preliminary care of the obstetric patient may be more clearly defined.

Assuming that eclampsia is the result essentially of a toxemia, that no serious poisoning can take place so long as the emunctory functions are properly performed and that the main avenue for the elimination of the poisons in question is the kidney, the first indication of danger must be sought in the urine. The other emunctory functions and the general condition must also be closely observed; but the more pronounced nervous phenomena of the preeclamptic state imply a degree of intoxication which in the vast majority of cases must have been preceded for several days or weeks by faulty urinary excretion. Proper observation of the urine, therefore, I repeat, should give ample warning of the approaching danger. Exceptions, it may be granted, are possible in instances in which from dietetic errors or other causes there is an abrupt and copious production of the toxic material but these must be rare.

As essential to the discussion of the subject in hand a few words may be permitted with reference to the causes of eclampsia. While our knowledge of the etiology of puerperal convulsions is as yet mainly speculative, the most satisfactory explanation, to my mind, is that which refers both the convulsions and the usually attending nephritis to a toxic substance or substances pre-existing in the blood. Thus, the kidney failure is not to be regarded as the primal source of the poisoning. It is a grave factor in the pathology, since it adds directly and indirectly to the toxemia and shuts off in greater or less measure the principal avenue of elimination. Of the character of the toxic material nothing

definite is known. Several poisons are doubtless concerned in the intoxication.

That the symptoms are not due to retention of the usual constituents of the urine is rendered probable by both clinical observation and by experiments upon animals. They differ essentially from those of simple anuria and they are unlike in kind and degree those induced by the injection of healthy urine into the tissues. On the other hand, that the intoxication may be in part or wholly the result of excessive production of poisonous material normally present in the blood cannot, in the present state of our knowledge, be absolutely denied.

Hughes and Carter, in an elaborate paper, based on an experimental study of uremia in general, express themselves as follows:

"It is probable that the origin of the poison is to be traced to the character of the food, and that its production takes place somewhere in the digestive system. For, the larger amount of poison is found in man, with his meat-ingestion and his complex and easily deranged digestion, next in dogs, with their semi-carnivorous diet, and least in the horse, a pure herbivore. Clinically it has been well established that cases of Bright's disease improve when meats and kindred substances have been removed from the food and do best of all upon that simplest of diets, milk. Experimentally it has been shown that the urine of animals is rendered least toxic by a milk diet. These facts would all point in one direction—they refer us to the digestive tract for the origin of the poison."

The following from their table of conclusions are of interest in connection with the preeclamptic toxemia of pregnancy:

"1. It is probable that in addition to the pathogenic poison of uremia there are, under certain conditions, other, secondary ones active in its production.

"2. The poison producing uremia will also produce nephritis and a fatty degeneration of the retina. (This was proven by injections, into animals, of uremic blood-serum or of dropsical effusion). The poison is probably some albuminous substance.

"3. It is possible to have uremia without any previously existing lesion of the kidneys."

If you ask why this particular intoxication is more common in gravid than in non-gravid women, no satisfactory answer can at present be given. It is evident that the pregnancy has in some way a pronounced causative influence and the fact is emphasized by the speedy subsidence of the symptoms which almost invariably

follows the evacuation of the uterus. It is significant that the toxemia, in the absence of chronic kidney changes, is an occurrence of the later months of gestation. This has led to the suspicion that faults of foetal as well as maternal metabolism may be concerned in the etiology.

For the sake of brevity, only the more important urinary signs will be specially considered. Of greatest practical value are albuminuria, diminished urea excretion, and scant quantity of urine.

Albuminuria.—The precise value of the presence or absence of albumin in the urine as a prognostic in the pregnant woman is a question of special practical interest. Authorities are agreed that albuminuria exists before the first convulsion in from 84 to 91 per cent. of patients who become eclamptic. It is well known that the urine is albuminous in all cases of true puerperal eclampsia after the first or second convulsion. This particular signal of the approaching danger is an especially valuable one because of the facility with which it may be detected with a minimum expenditure of time, pains, and skill. Unfortunately too many physicians trust to it alone. This would not be so bad but for the fact that as a rule the examinations are made only at long intervals. If tests for albumin were repeated once or twice weekly during the last three months of pregnancy and at occasional intervals earlier there would be ample time in threatened eclampsia for the institution of preventive measures.

My own belief is that albumin is to be found in the urine even more frequently in the preeclamptic state than is indicated by the foregoing figures. In my private practice true eclampsia has never occurred after the persistent absence of albuminuria. That convulsions are frequently absent in the presence of albuminuria is a matter that does not concern us here.

To what extent the total absence of this sign is to be accepted as a favorable prognostic is a question that may perhaps be still more positively defined by further observations. Carefully recorded cases of eclampsia without preexisting albuminuria would be valuable contributions to our knowledge of this subject.

Hysterical, apopleptic, epileptic, and meningitic convulsions must, of course, be ruled out and brain tumors excluded.

We cannot lose sight of the fact that instances of eclampsia are sometimes reported in which no kidney change is found at autopsy. How long and to what extent albuminuria may have existed in cases in which no kidney lesions have been *discovered* after death is a question which I must leave to the pathologist.

I am not forgetful of the fact that albumin is often absent in chronic nephritis, but this is scarcely true in pregnancy in women that have convulsions. A true pregnancy nephritis with albuminuria sooner or later supervenes upon the chronic.

Nor can we forget that the unstable equilibrium of the nervous system, especially in the later months of gestation, is a prominent etiological factor in the eclamptic seizure. Yet that this alone is ever a competent cause of true eclampsia of childbed is improbable.

At the most the number of exceptions to the rule I have stated is small. If the urine is watched with due vigilance the continued absence of albumin is a fairly trustworthy reliance.

Herman alludes to the fact that the albumin in acute nephritis is mainly paraglobulin while in chronic nephritis it is chiefly serum albumin. The distinction has little importance for our purpose. It may have some relation to the treatment, since in the chronic form the pregnancy can seldom be safely trusted to go to term or even to the viable period. Yet the history and the microscopic findings would afford a better means of differentiating between acute and chronic lesions than the character of the albumin.

Urea.—Most physicians look to urea as the best clinical index of the excretory activity of the kidneys. It is a particularly valuable guide because of the precise methods at easy command for its determination. The practitioner may usually feel secure so long as the urea elimination is near the normal—four or five hundred grains per diem. Special vigilance is demanded when there is a marked falling off in the quantity. Davis found his patients were benefited by stimulation of the excretory functions when the percentage of urea did not exceed 1.5.

A word of warning should be uttered against too implicit reliance on urea determinations alone. To my knowledge abortions and premature labors have been unnecessarily induced through over-confidence in this particular clinical sign. It is not, alone, an absolutely reliable guide. The other urinary findings and the general condition of the patient must be considered. The urea is normally somewhat diminished in pregnancy and is subject to considerable variation within the limits of immunity depending on the quantity and character of food and other causes. Exceptionally, uremic manifestations, especially eclampsia, may be wholly absent in individuals whose urea-excretion has been greatly diminished for days and weeks. In a case recently under my care the urea during the ninth month ranged from 192 to 240 grains per day, rising to 296 grains a few days before labor. Yet the woman

was apparently in perfect health. Other similar cases could be cited from my histories.

But these are exceptional experiences. Notable diminution of urea should always excite suspicion and a marked falling off is usually of grave import. The weight to be attached to it must be determined in part by the other clinical signs.

Quantity of Urine.—A most important and too frequently neglected element in the prognosis as relates to the preeclamptic state is the daily quantity of urine. It is especially useful as a clinical guide since it is a matter which can be trusted largely to the patient's own observation. If every gravida were taught to measure the urine once or twice weekly during the later months of pregnancy and duly impressed with the necessity of keeping it at or above 3 pints per diem, convulsions in childbed would be almost unknown. Eclampsia, it is true, is said to be possible in a patient who is passing a good quantity of urine of normal specific gravity but such instances are among the curiosities of medical practice. They have not fallen under my observation in the obstetric patient. So long as the quantity can be kept a little above the usual health standard and of good density, immunity from grave toxemia is well nigh absolute.

I do not forget that the woman may have a chronic nephritis, in which the volume of urine is large, but eclampsia in such cases is infrequent unless an acute lesion supervenes upon the chronic. This class of cases can scarcely fail of recognition early in gestation and, as a rule, the pregnancy must be terminated. The importance of quantity as a signal relates especially to the average patient in whom there has been no preexisting nephritis. In practically all pregnancies a large quantity of urine, if it is well above the usual maximum, is a sufficient guarantee against convulsions or grave toxemia. Personal experience would lead me to believe that even in the presence of albuminuria and diminished urea excretion childbed eclampsia will not occur so long as the volume of urine can be maintained at about 70 ounces in 24 hours. If this is true it must be assumed that the quantity of toxic material which passes off in the urine is not measured by the percentage of urea elimination. Apparently an excessive flow of urine can generally be trusted to rid the tissues of the eclamptic poisons even though the urea be diminished. With the necessary precautions, close observation of the quantity of urine has a greater prognostic value than urea determinations.

In conclusion it should be urged that the obstetrician must de-

pend on no one of the foregoing data in the supervision of his patient. All must be watched in the safe conduct of pregnancy. The urine being normal in amount and character, true puerperal eclampsia need scarcely be feared. Departure from the normal in any of the foregoing particulars demands redoubled vigilance.

DISCUSSION.

Dr. R. L. Dickinson: The author's clearness of synopsis and epigrammatic statements leave nothing in the field uncovered and one would be accused of temerity if he presumed to discuss the paper. What I know of the subject I have learned from him and I have been taught a great deal from the cases which he has been kind enough to see with me in consultation, when he assisted me in carrying the patient on to term—watching her carefully and keeping the emunctories in working order during the remaining months of pregnancy—cases in which, if we followed certain teaching, labor would have been induced at once. It was he who emphasized the importance of the fact that pregnant women should pass large quantities of urine, and that, if the work of the kidneys was fairly up to normal and the patient was watched as to her diet, bowels, and skin action, we need not fear a crisis or outbreak. It is according to this teaching that we treat the large number of cases of threatened eclampsia which are seen at the Kings County Hospital, in which otherwise pregnancy would have to be interrupted. Upon going off duty three months ago I remember that four such cases were being watched in the hospital. Upon returning to duty a few days ago, I learned that all had been safely carried to term, although in each case there was a considerable degree of albuminuria. These patients were fed upon milk, their exercise was restricted, they were given a steam-bath once or twice a week, and their urine was carefully watched. This plan of treatment can easily be carried out in a hospital, where the patients live a regular life and have proper care, but it would not be possible in private practice among the very poor. I am sure that the rules laid down by the author will prove to be safeguards, and I feel that he has cleared up a subject which is often written about in a thoroughly confusing manner.

Dr. Maddren: I heartily agree with the views expressed in the paper. It would simply be a repetition to say that we should be more careful about urinalysis during pregnancy. I am in the habit of making frequent examinations of the urine, especially

during the latter months of pregnancy, and I believe that in this way we can carry patients through under the conditions referred to by the author. If any chronic disease of the kidneys exists, examination of the urine will show it and will put us on our guard against eclampsia and enable us to carry the patient on to term.

Dr. Polak: After hearing Dr. Jewett's most interesting paper there is very little to add. There are two or three points, perhaps, which might be more forcibly impressed upon the general practitioner, who seems to forget the important point brought out by the author, *vis.*, that eclampsia is a toxemia due to faulty action of all the emunctories and not of the kidneys alone. Two classes of symptoms are present, first, the early signs, the urinary symptoms mentioned in the paper, such as albuminuria, diminution of urine, and the presence in the urine of epithelial, granular, and, at times, if an acute nephritis develops, blood-casts. Deficient action of the bowels, to which Davis has called attention, may also be mentioned, as well as diminished skin action. Secondly, the nervous symptoms, such as headache, etc., which are due to the toxemia. I have seen many practitioners pass over both and wait for swelling of the feet and general anasarca to set in before they begin treatment.

The observations in regard to the urine, as to its quantity and specific gravity instead of paying so much attention to albuminuria, referred to by the author, have always been closely followed by me. There can be no doubt, however, that albuminuria is a causative factor in the production of eclampsia, nor does the fact that it has been absent in some few cases prove to the contrary.

In regard to keeping up the amount of urine, it is very difficult to make patients, especially women, drink enough water. In my experience the gynecological woman excretes too little urine, therefore we must educate our patients, as well as the general practitioner, as to what water will do. It is wonderful what changes follow the copious use of water both by mouth and by the bowel, and this is especially true in regard to the skin action. I have a case in mind, that of a woman five-months' pregnant, who presented all the symptoms of impending eclampsia, passing but twenty ounces of urine, the specific gravity of which was but 1004 and the urea below 100 grains, in twenty-four hours. This patient was safely carried to the end of term by being put to bed,

made to drink large quantities of water during the day, and having water injected into the bowel each night, beginning with a pint and gradually increasing the quantity until she was able to retain two quarts. Under this treatment 97 ounces of urine were passed daily.

Dr. A. J. C. Skene: I may refer to a class of cases in which there is a predisposition to renal disease during pregnancy. For a long time I have noticed that women with a given kind of an organization which may be described as chlorotic, are by far more liable than others to develop kidney complications during gestation. By "chlorosis" I mean a subject in whom the circulatory apparatus (the heart, arteries, and the pulmonary artery, especially) is undersized and the glandular system throughout to some extent defective; hence, the blood-making process is defective and the patients, as a rule, are anemic. In conjunction with this anatomical peculiarity, these women usually have small reproductive organs, by reason of arrested growth, and, while they perform their functions, they do it to some disadvantage and in an imperfect way. Such women are usually rather stout and, although anemic, have an appearance of health to the non-professional eye. They are predisposed to eclampsia from toxemia because they are at all times, whether pregnant or not, in a somewhat toxic condition. Disintegration and elimination are imperfect on account of imperfect aeration of the blood. It is said that these patients have small lungs as well; be that as it may, they are poorly supplied with well aerated blood, owing to the small size of the pulmonary artery. In a word, these women are the subjects of what used to be termed "excrementitious plethora," due to the fact that disintegration and elimination are imperfect, and, hence, they readily become toxic when the kidneys fail to do their work during gestation. In recent years I have been treating such patients in the hope of curing them. I think this can be done if they are seen early in life, especially at the time of puberty. At that time the constitutional defects can be largely overcome by diet, exercise, and general hygiene.

In regard to the prevention of threatened eclampsia, I consider that the excrementitious plethora, to which I have referred, plays such an important part that I put the patient upon rest and starvation diet. This differs from the rest-cure of Weir Mitchell, which consists of rest and forced feeding. I keep the patient in a condition of hunger, and in this way there is no accumulation of poorly digested material and consequently less to do in the way

of disintegration and elimination. It is my opinion that one of the reasons why pregnant women suffer from this plethora and the uric-acid diathesis is because they are overfed. I allow only a limited amount of exercise of body and mind, and in this way lessen the desire for food, order a low diet, and plenty of water. A great deal has been said about the kind of food a pregnant woman should eat in order to avoid kidney complications. It is my belief that the danger lies in the quantity of food taken.

To sum up, the chlorotic organization is predisposed to renal complications, and, finally, the superabundance of food which is craved and eaten during pregnancy is an immediate and direct cause of this kidney trouble.

Dr. Jewett, in closing: The object of the paper was to present the smallest possible group of urinary observations which can be safely trusted in the prophylaxis of eclampsia. The scope of the paper did not permit mentioning all that could be said even upon the subject. The three urinary items referred to are the most important and are sufficient in most if not in all cases.

In reply to Dr. Polak: It is, of course, understood that albuminuria is not necessarily a matter of serious pathological importance; its presence, however, should lead the physician to be on the lookout for other symptoms.

I am indebted to Dr. Dickinson and Dr. Polak for the very practical support they have given to the points I have tried to make. To Dr. Dickinson's question, how early and how often examinations of the urine should be made, it is difficult to lay down definite rules for all patients. The woman should be kept under close observation from the beginning of pregnancy. If she is intelligent, a good deal can be left to her charge, especially for the first six months. It is very necessary to impress upon the patient pregnant for the first time, the importance of reporting at once anything apparently wrong in her condition. Otherwise she may accept slight departure from health as a part of the natural course of pregnancy, and thus lose valuable time. As a general rule one urinary examination a month will suffice for the first six months. For the remaining period two, four, or eight or more examinations per month may be required according to circumstances. Much can be trusted to the mother who will watch the quantity carefully with occasional measurements in the later months.

Preeclamptic toxemia is rare in the first six months and in such cases there is generally a chronic background.

A profitable subject for a future discussion would be the etiological relation of the pregnant state to eclampsia, with special reference to auto-intoxication of both fetal and maternal origin.