

TOXÆMIA OF PREGNANCY: ITS DIAGNOSIS AND
TREATMENT.¹

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By the term *toxæmia of pregnancy* we understand a condition occurring in the pregnant woman in which toxic material is present in the body in excess. There can be no nutrition without the production of waste, and when the dual existence in the body of the pregnant patient is considered, it is not strange that an additional quantity of waste products is present. The excretion of this material is effected largely through the agency of the kidneys, and hence attention was first attracted by those cases where kidney failure was the first and prominent symptom; but as our knowledge of pathology is increased, we see that

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the kidneys are but partially involved, and that we must look farther in order to understand the condition.

The mode of production of the toxins, or poisonous waste, which threaten the pregnant woman, is not clearly explained. The usual metabolic processes account for a portion of the material present, while a certain number of cases point strongly to an acute intoxication with the products of bacteria. While the chain of evidence in the latter is not complete, they offer a most suggestive explanation for conditions hitherto not understood. It is the purpose of the present paper to consider methods of clinical investigation which have been found useful in the diagnosis of toxæmia, to mention agencies proven efficient in treatment, and to report illustrative cases.

The clinical investigation of the action of the kidneys during pregnancy has received so much attention that we omit reference to methods of examination commonly in use. It is especially important that the amount of urine secreted be carefully estimated; and while this is practicable in hospitals, ingenuity and patience must be exercised in private cases where a trained nurse is not at hand. The value of microscopic examination of urinary sediment can scarcely be overestimated in the study of pregnant patients. In the cases furnishing a basis for this paper we have examined the urine to ascertain its specific gravity, color, reaction, the presence or absence of albumin, of glucose, lactose, and urea. The two constituents especially important I consider to be urea and sugar or acetone.

As regards the examination for urea, the method is based upon the action of bromine upon sodium hydrate, the urinometer employed being that designed by Lyons. The significance of urea in the urine during pregnancy lies in the fact that it furnishes an index of the amount of waste which the patient is excreting. The literature of the subject furnishes abundant proof that solutions of urea may be injected into animals without causing convulsions; it is also true that a patient may endure a temporary suppression of urine which is almost complete, may escape convulsions, and recover; but the fact remains that the percentage of urea in the urine of the pregnant woman is a valuable indication of the efficiency of her excretion by means of the kidneys. It has been my custom to estimate the percentage of urea before and after labor, and wherever the percentage of urea has fallen below 1.5 we have found occasion to stimulate the patient's excretory processes, with a distinctly favorable result in all cases where symptoms of toxæmia were present.

The following fatal case of eclampsia well illustrates the fact that eclampsia may occur while the urine shows little abnormality, except deficient urea:

S. H., colored, aged nineteen, was seen by the resident physician of the Jefferson Maternity on June 21st at her home. She was pregnant

for the first time, in the ninth month, her fœtus occupying the first position. The patient's legs were very œdematous, tense, pitting upon pressure; the right labium was enlarged to the size of an orange, and the patient complained of frequent micturition, constipation, and great discomfort. She was ordered a saline purge daily, and Basham's mixture as a tonic. The resident physician was again summoned to the patient on June 25th, finding her in labor. As she then consented to go to a hospital, she was brought to the Maternity in an ambulance. Her labor was rapid, although the head remained upon the perineum for about an hour, while the labia became exceedingly œdematous. The child was a female, weighing six pounds, and apparently healthy. Labor terminated at 9.40 in the evening; at 1.40 the next morning convulsions occurred; these were treated by hot packs, chloral and bromide, digitalis, calomel, and other agencies, as indicated by symptoms. The patient's convulsions continued, and death occurred fifteen days after her delivery. A post-mortem examination was unfortunately impossible. An examination of her urine was made during the time of her eclampsia, and before eliminative treatment had modified her condition. Its results are appended:

Chemical.

Date.	Color.	Specific gravity.	Reaction.	Chlorides.	Serum albumin.	Sugar.	Urea.	Remarks.
June 26	Yellow.	1002	Acid.	Normal.	50 ct. gm. to litre.	None.	0.2 per ct.	
" 27	Yellow.	1004	"	"	25 ct. gm.	"	0.8 "	12.30 A. M.
" 27	Yellow.	1008	"	"	Trace.	"	1.4 "	4 A. M.
" 27	Reddish-yellow.	1012	"	"	Trace.	"	1.4 "	3 P. M.
" 28	Reddish-yellow.	1004	"	"	None.	"	2.1 "	

Microscopical.

During the first day of attack the urine contained a few leucocytes, or pus-cells; amorphous urates; a few crystals of calcium phosphates. Leucocytes disappeared in later examinations. The usual bacteria were found; in the first slide examined there was *one* compound granular cast. As a whole, the urine was that of the ordinary pregnant woman, with a lower percentage of urea.

In 84 cases in which a total of 564 examinations was made (*i. e.*, 331 before labor and 233 after parturition) the average percentage of urea was found to be 1.4 per cent. before labor. It was noticed that in the majority of cases the amount of urea increased after the delivery of the patient, the average being 1.9 per cent. On the other hand, marked diminution in the quantity of urea occurred only in cases either having, or threatened with, eclampsia, or manifesting symptoms of marked toxæmia.¹

Symptoms of toxæmia which called for active treatment were a gradual diminution in the excretions of the patient, both solid and liquid; diminu-

¹ The urinalysis in these cases was the work of Dr. Wm. H. Wells, Assistant Demonstrator Clinical Obstetrics, Jefferson Medical College.

tion in appetite, with complaint of slight nausea or gastric distress; headache, a clammy skin, or, in some instances, a dry skin with deficient perspiration, and lassitude, mental and physical. The patients under observation were all expected to do light housework up to the time of labor, and hence a good opportunity was afforded to judge of the occurrence of lassitude. The case of S. H., just narrated, afforded no such opportunity for diagnosis, as she entered the Maternity already in labor.

In the study of these cases we have not regarded the presence or absence of serum albumin as indicating toxæmia. Where a microscopic examination of the urine showed the presence of casts and epithelium, the concurrent presence of albumin was, of course, significant; Eschbach's albuminometer we found convenient and practically accurate; but where the microscope failed to find pathological elements, and albumin was present, it was not regarded of importance. In about one-half of the patients, sugar was present at irregular intervals during pregnancy and the puerperal state. It was found in small quantity, and usually in the form of lactose or glucose. The test most useful in its determination was that of fermentation; subnitrate of bismuth and the use of Fehling's solution were also regarded as valuable adjuncts. The presence of glucose and lactose bore no direct relation, so far as we could observe, to a toxic condition of the patient. Lactose was frequently more abundant as the secretion of milk became established. In cases of toxæmia, however, glucose was present, and possibly acetone would have developed had excretion not been freely stimulated.

Of especial interest in considering the question of toxæmia in the pregnant and puerperal state is the relation which bacteria and their products may bear to the pathological condition present. The following case furnishes an illustration in point:

A. F., aged twenty-one years, colored, a servant woman, was illegitimately pregnant for the second time. She was admitted to the Maternity April 16th, and performed the portion of household work assigned to her in apparent good health. Examination of her urine revealed nothing indicating an abnormal condition. An examination of the genital tract gave evidence that the patient had at some time suffered from gonorrhœa, although no acute process was then present. She was delivered on May 13th, after a spontaneous labor of twelve hours. A laceration of the mucous membrane of the vagina occurred, which was thoroughly doused with a bichloride of mercury solution, 1:4000, and dusted with iodoform. Her child, a female, weighed six pounds and four ounces, and was in good condition. The placenta was remarkable for the abundance of calcareous material contained in it. Nothing abnormal occurred in the condition of the patient until the seventh day after delivery, when she had a chill, and her temperature rose to 105.2° F. An examination of her urine soon after delivery revealed the presence of pus. The bladder was accordingly doused with creolin mixture, and the patient was given salol internally. Soon after the occurrence of the chill the uterus was curetted with a douche curette, but no evidence

of a septic process in the uterus or vagina was obtained. The uterus was not tender but was slightly enlarged, the abdomen was not swollen, and there was no evidence of pelvic inflammation. The urinary tract, however, seemed the seat of bacterial invasion. The urine remained acid in reaction, and pus continued to be present. The percentage of urea still remained nearly normal, traces of sugar were found, and a considerable quantity of albumin.

The report on urine examination is as follows:

Chemical.

Date.	Color.	Reaction.	Specific gravity.	Chlorides.	Serum albumin.	Sugar.	Urea.
May 4	Yellow.	Acid.	1025	Present.	2 gms. to litre.	None.	1.9 per ct.
" 12	"	"	1022	"	2 gms.	"	1.7 "
" 22	Reddish-yellow.	Faintly.	1018	"	2 "	"	1.8 "
" 26	Red.	"	Not taken	"	5 "	"	1.3 "
" 29	"	"	1012	"	5 "	Trace lactose?	1.5 "
June 3	Reddish-yellow.	"	1010	"	3 "	None.	1.7 "
" 5	Reddish-yellow.	"	1010	"	2 "	Trace lactose?	1.8 "
" 8	"	"	1012	"	4 "	None.	1.6 "

Microscopical.

On all examinations large numbers of pus cells could be seen. Granular, hyaline, and a few blood-casts were present in varying numbers. Epithelium from the bladder, with a few cells from the kidney, could always be seen.

The patient died of exhaustion on the twenty-seventh day after the birth of her child. At no time could an enlarged kidney be felt by palpation, nor was there evidence of abscess in the pelvis, abdomen, or kidney. Post-mortem examination showed that the uterus, tubes, and ovaries were normal. Both kidneys were much enlarged; capsules adherent; the ureters and bladder were thickened, and gave evidence of a chronic inflammation. Microscopic examination of the kidney revealed an acute parenchymatous nephritis.

As regards the possibilities of acute infection in this case by physicians or nurses, it can only be said that the same antiseptic precautions were scrupulously observed regarding her that are observed in all cases, and that at the time of her illness there was no other case in the Maternity presenting the same or similar complications. Careful study of the patient and the circumstances of her illness have led us to believe that germs, originating in a previous gonorrhœa and finding lodgment in the urethra or bladder, after labor invaded the ureters and kidneys, causing the nephritis which produced death. The patient's symptoms were distinctly those of intoxication with ptomaines. She yielded not at all to treatment, but grew progressively weaker, never rallying from the poison which ended her life.

The following cases of toxæmia, with threatened eclampsia, were terminated by treatment appropriate for the condition, and by the prompt induction of labor.

A. P., aged thirty-three, white, was pregnant eight months. She had borne several children, and on a former occasion said that she had suffered from "kidney trouble." She was pale and anæmic in appearance, and complained of headache, disordered vision, and swelling of the feet and ankles. Examination of her urine showed a very considerable amount of albumin, diminution in the excretion of urea, while the urine contained a large number of red blood-disks, with epithelium from the tubules of the kidney, and granular casts. After free purgation and a hot bath, labor was induced, resulting in the speedy delivery of a living child. The patient's symptoms were soon relieved, and she made a slow but satisfactory convalescence. In her case the exact condition was determined more by the use of the microscope than by any one agency, although thorough study of all the points in the case was necessary to comprehend its scope.

A second case of toxæmia treated by the induction of labor occurred in a woman the victim of chronic alcoholism, who entered the Maternity in a partially intoxicated condition, and was thought by the police to be in labor. It was observed in her case that excretion was deficient, that the percentage of urea was less than normal, and that she manifested the nervous phenomena to which attention has been drawn in the foregoing cases. Labor was accordingly induced; it was complicated by a false position of the head, which lodged with the parietal bone against the brim of the pelvis. It was necessary to give the patient chloroform, and to perform podalic version. She and her child made a good recovery.

The fact that the toxæmia of pregnancy results in a condition of marked anæmia after the puerperal period is illustrated by the case of a patient who suffered from persistently defective excretion during her pregnancy and after labor. Her child perished from pulmonary catarrh, and she herself was transferred to the medical wards of a hospital, where her condition of anæmia and kidney failure could receive more extended treatment.

It is quite possible for a condition of marked toxæmia to be present in which the examination of the urine fails to reveal either casts, albumin or marked deficiency in urea.

A primigravida, the wife of a physician, and a woman of more than ordinary intelligence regarding physiology and medicine, gave her husband great anxiety by reason of attacks of epigastric pain which might be described as gastric crises. This pain occurred at irregular intervals, was often worse at night, preventing sleep, and was unattended by nausea or vomiting. The patient's bowels moved daily, her legs were not swollen, the amount of urine secreted daily had gradually diminished, but so gradually that the patient's attention was not drawn to it until she was requested to give information regarding this point. The results of two examinations of the urine are as follows:

October 11, 1893. Color, yellowish red; sp. gr., 1026; reaction, acid; chlorides, normal; albumin, a trace; sugar, none; urea, 1.4 per cent.

Microscope. A considerable shedding of epithelium from bladder, though a few cells from the ureters can be seen. Cells are pale, and many are somewhat degenerated as to form. Uric acid, in various forms, abundant. A form somewhat resembling an old granular cast much broken down. A few crystals of oxalates.

17th. Color, yellow; specific gravity, 1014; reaction, acid; chlorides, normal; sugar, none; albumin, none; urea, 1.1 per cent.

Microscope. A large number of crystals of ammonia urate and uric acid in various forms. No casts of any kind, and very few epithelial cells.

Pronounced nervous symptoms were present, consisting of coronal and frontal headache, extreme restlessness, and melancholia greatly exceeding the usual timidity manifested by patients in her condition. The skin was slightly dry, the tongue clean, the appetite poor, while meat was a favorite article of diet. Her epigastric pain and nervous symptoms became so pronounced that her husband requested me to see the patient. A careful examination revealed the facts already narrated, and led to a diagnosis of toxæmia. The examination of the urine revealed no marked abnormality, except deficiency in quantity. The patient was at once given two and a half grains of calomel, with ten grains of soda at night, and the next morning the compound colocynth pill of the Pharmacopœia. Her diet was restricted as closely as possible to milk, and she was given a warm or hot bath every evening before retiring. Woollen underclothing was worn. In less than forty-eight hours from the time when the patient was first seen a marked improvement had occurred. The amount of urine had increased, the bowels had moved freely, the epigastric pain was less, the patient's mental and nervous condition was much better, and her appetite was not satisfied with the milk diet enjoined. She was urged to be as much as possible in the open air, and her diet was enlarged to include fish, oysters, milk, bread, and fruit. The warm bath was continued at evening, and a colocynth pill and an occasional dose of calomel were employed, as her husband found necessary. A week from the day of my first examination her symptoms had entirely disappeared. This patient's mother perished from eclampsia at her birth. That this case could easily have gone on to eclampsia we believe from the very unstable condition in which we found her nervous system and her diminished excretion. She was shortly afterward delivered of a fine male child after a normal labor.

The treatment of the toxæmia of pregnancy must be instituted with reference to promoting the action of five excretory organs—namely, the kidney, liver, intestine, skin, and lungs. The usual precaution of limiting the patient's diet largely to milk is of course indicated, but when nutrition suffers from the monotony and distastefulness of milk, there should be no hesitation in giving a more liberal diet to preserve the patient's strength. Fish and oysters, the white meat of fowls, fruits in abundance, and the more digestible sorts of bread, fresh and nutritious, form a usually acceptable diet. Pure water must be taken, but not in excess, as it is possible to seriously embarrass the kidneys by a sudden increase in the amount of fluid taken. Tea had better be omitted, while the diuretic effect of coffee is sometimes of value.

The literature of the subject affords abundant evidence that the liver has an important part in the production of this condition. However theory may dictate regarding treatment, I have no doubt of the practical advantages following the occasional use of calomel and soda to promote the action of the liver and kidneys as well. This should be followed by a purgative producing free and liquid stools. Salts of potassium should be avoided because of the irritant properties possessed by potassium when introduced into the fluids of the body. Colocynth is a convenient and efficient drug for this purpose. The bath and pack are the only efficient remedies which experience suggests in promoting the excretory action of the skin. Where the hot bath is depressing, the warm bath, accompanied by the ingestion of a small quantity of hot water, is of decided value. This may well be taken just before retiring, thus avoiding the danger of exposure to cold following the bath. Light woollen should be worn next the skin in summer or winter. In addition to the bath, in severe cases the pack in sheets wrung out of hot water, or the hot-air bath, is of the utmost value. Further, where a condition of moderate toxæmia exists, or continues a long time, yielding to treatment with difficulty, great benefit will be found from gentle massage; this should include the limbs and back, avoiding the abdomen. It may well be given at night, followed by the bath, and often secures for the patient a refreshing sleep.

The importance of fresh air in abundance for these cases is sometimes overlooked; in summer, conditions for obtaining good air are very commonly present; but in winter it is necessary to attend to this point.

Especial attention is called to the diagnosis of toxæmia from the general condition of the patient's nervous system; a careful and experienced observer can detect a very different condition in the toxæmic patient from the simple nervousness and apprehension of the pregnant woman; the condition is that of intoxication varying in degree; thus we recall the case of a woman admitted to a hospital and soon after taken with severe eclampsia; after a dangerous illness of several days she recovered, having been utterly oblivious of her coming to the hospital, and of her illness, until she was virtually convalescent. She had been as completely intoxicated as if drugged with alcohol or opium. An interesting manifestation of this condition is afforded by the peculiar mania often seen in eclamptic cases; thus in the case of S. H., already described, for several days before death her delirium was a very pitiable form of mania.

The clinical picture afforded by the toxæmic condition must impress itself upon the careful observer as one of an intoxication showing itself by a disordered nervous system. We regard as cardinal symptoms of this condition the nervous phenomena already described, and diminished excretion. Upon these a diagnosis is to be made and the treatment of

the case conducted. As regards the cardinal principles of treatment, we are opposed to the use of sedatives and narcotics; the patient's need is for elimination, and that must be secured as promptly as possible. The sedative effect of eliminative treatment is often remarkable; thus in the case of the physician's wife already described, she asserted that the most enjoyable features, physically, of her life during the last weeks of her pregnancy were the warm bath taken at evening and the few hours of refreshing sleep which followed. She also recognized the distinct benefit obtained by free purgation.

In the face of threatened eclampsia, our duty lies in prompt emptying of the uterus. Here an anæsthetic is often requisite at the time of labor, and my preference is for chloroform. The danger of delay in emptying the uterus is too familiar to require mention, and when the patient's symptoms are not relieved by thorough elimination from the intestines, skin, kidneys, liver, and lungs, the time for delay is certainly past, and we shall not be faithful to our duty if we allow a patient to go further in this dangerous condition. The recent literature of eclampsia contains striking evidence of the value of terminating the pregnancy by dilating the uterus and removing the fœtus. If this be done under anæsthesia and with antiseptic precautions, the results are sufficiently good to command a careful attention for this method of treatment. In my experience, it is a mistake to employ drugs which tend to depress the patient and favor the occurrence of œdema; such is pilocarpine. When stimulation is needed, I have seen benefit from alcohol, digitalis, and in cases of eclampsia when labor had terminated and exhaustion threatened, in the hypodermatic use of strychnia.