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A STUDY OF VARIOUS CASES OF PREGNANCY TOXEMIA.*

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DURING the winter and spring of 1918 the writer has had under observation thirty-two cases of preëclamptic toxemia or eclampsia. Since May, 1917, forty-nine cases have been under treatment, including six cases of pernicious vomiting.

Why there should be in the six weeks from January 1 to February 15, 1918, as many such cases as would ordinarily be met in a year is a mystery. One cannot account for the frequency of toxemia

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except by charging it either to the extreme changes in temperature from a bitter cold to mild weather, and back again, just as epidemic jaundice or herpes zoster has in some seasons been ascribed to climatic conditions; or else to the nervous unrest and tension from which every sensitive woman suffers on account of our entrance into the war. Nearly every family has some of its younger men in the service, and even those families that are not represented, are living under such abnormal conditions that resistance is easily overcome; and if the patient has a tendency to be under par, she loses her equilibrium of absorption and elimination.

The insufficient elimination of toxins generated at the placental site and by the fetus, together with the extra burden thrown on the organism of the mother to provide for oxygenation for herself and the developing child, become greatly increased, owing to extreme cold weather, because of the loss of equilibrium between the surface of the body and the heat centers. This may interfere with the metabolism to such a degree as to produce an acidosis as is claimed by Martin Fischer in his argument showing the relation between edema and acidosis. Nervous strain, moreover, produces fatigue, insomnia, and faulty metabolism.

Eclampsia, which still claims a death rate of 25 to 40 per cent. by the average statistics, was long ago designated by Zweifel as the disease of theories. We have not been able up to the present day to reach a basis where we could absolutely prove its origin or trace its etiology. The signs and symptoms are, of course, familiar; and the findings at autopsy—liver, kidney, and brain necrosis—all have seen. From these facts, we gain the clue upon which our plan of treatment is founded; but while experimental evidence and grouped phenomena are helpful, every man draws his own conclusions from the cases he has seen and applies them according to his own mode of reasoning, which may be a temporary theory or may become an obsession.

As witness of the statement that toxemia is yet not without the bounds of theory, one's attention is called to a valuable article on "Treatment of Eclampsia" by Dr. J. Clifton Edgar in the *Journal of the American Medical Association* of April 27, 1918. Dr. Edgar says: "A one time advocate of active medical and surgical treatment, and bitterly opposed to morphine in eclampsia, experiences in the last five years have radically changed my views and teaching. But I also am still uncertain whether morphine increases infant mortality." And also, "A one time enthusiast in the free use of veratrum viride in eclampsia, I frankly confess to having changed

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my views. I fear its shock-producing effect, although I still occasionally employ it in small doses in selected cases." In other respects Edgar's treatment varies but little from our own established technic.

A paper by D. M. Erwin of the Department of Pathology, University of Cincinnati, contains the results of some striking research work in regard to the relation of blood pressure to convulsions (*J. A. M. A.*, April 27, 1918). He contends that: "The chemical substance in the blood only produces edema. The height of the blood pressure over the intracranial is the margin of safety. When this margin is at a small positive quantity, the brain must undergo some change. The vasomotor center fags. As a consequence, the blood pressure, which has been maintained as high as possible, drops. The intracranial pressure now becomes greater than the blood pressure; the margin is negative; the pupils dilate and convulsion comes on; the sharp tense contractions of the muscles play a vicarious part by forcing the blood pressure to the periphery and raising that in the brain until the margin is again positive. With this renewed blood supply the centers again take up, for the time, their work."

Knowing that next to sepsis, eclampsia is the most deadly of all obstetric complications, every woman has, on coming under our observation, been examined with the realization that her symptoms may possibly suggest at any time that she is a preëclamptic. As soon as her pregnancy is recognized, blood pressure, eye symptoms, and urinalysis are made a routine; the teeth and tonsils inspected for foci of possible infection.

The etiology of eclampsia as formulated into a table of relative values is as follows:

1. Failure of elimination of toxins. These in the early months are doubtless due to the placenta, and in the second half of pregnancy doubtless to the excretions of the fetus.

2. Infections of various types throw a burden on the pregnant woman.

3. Resulting from pressure and from stasis with a decrease of normal power of maternal oxygenation, thus interfering with lung expansion, and with the action of the heart we have an asphyxia of greater or less degree. LaVake has pictured a woman pregnant who has thus thrown on the excretory organs a double load.

The patient who has had a previous scarlet fever or some similar disease, is handicapped in elimination of bacteria or their toxins which emanate from such foci as infected tonsils, or teeth, or from colon bacillus. These may further damage her resistance.

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The basic feature of the etiology is a source from the placenta or the fetus. The degree of overwhelming by the toxins is dependable on two conditions; first, rapidity of the generation of the toxins; and second, the compensatory ability shown by the organs of elimination to throw off the poison.

Beyond question there are depressing effects from the presence of the toxin shown by the lesions in kidney, liver, and heart. These add to the risk of the pregnant woman.

The fetus makes still heavier demands on the powers of oxygenation of the mother in the later months of pregnancy; and even though reduced by the stasis of the abdominal organs resulting from pressure through the diaphragm this demand is followed by decreased expansion of the lungs and an interference with the cardiac rhythm. This causes a maternal asphyxia of a mild type which again lessens resistance and increases the damage to kidneys and liver. Pyorrhea or pyorrhea alveolaris should place the attendant on his guard against his patient's developing a later toxemia.

A case of eclampsia will always demonstrate some focus of infection before it develops; and that case even under careful observation up to the week of delivery should show no signs but the trace of albumin, higher blood pressure, and nervous manifestations.

Then other cases with temperature manifested before any examination or interference has been done, are in still a third class, usually multiparæ, a number of cases which develop toxemia after having had previous normal pregnancy and labor with a definite history of infection since the last labor. The bowels should move once daily. This removes excretory products, bacteria, and toxins from the system, relieving stress on the kidneys and saving injury to the intestine, which would result from large hardened masses of feces, which try to pass the unusual obstruction, and from pressure, and thus result in infection of the blood stream.

The hematogenous kidney, which has been accurately diagnosticated and successfully treated by surgical procedure by Dr. Howard Hill, is ample evidence that colon bacilli do gain access to the blood stream, and cause infection of the kidney, through infarcts in its deep structure. Pressure effects on the bowel also disturb the normal balance of bacterial growth and result in the development of products particularly toxic in nature. Six to eight glasses of water and milk should be taken. These toxemic patients fare better by eating only one meal a day. Exercise and massage to promote general circulation are endorsed. Hemoglobin should be estimated, and iron given in the food or in the form of Blaud's mass, if needed.

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The urine should be examined during the first six months, once a month; during the last three months, twice a month. If any symptoms arise, examination should be made daily. The patient is always instructed to notify her attending physician if any danger signals, such as unilateral headache, edema, disturbed vision, epigastric pain, or nausea should appear.

The asphyxia raises the blood pressure of the adrenal glands; and as a consequence, an extra amount of adrenalin is thrown into the blood stream. In consequence of the concentration, acidosis from the increase of acidity results. Associated with this asphyxia and output of adrenalin is the increase in the rise of blood pressure and increased coagulability of the blood. These always occur in eclampsia in the later months.

Accepting a rational theory of the production of eclampsia, we have tried to standardize our plan of prophylaxis and treatment as follows:

1. Diet which shall be of nonirritating food.

2. Elimination encouraged by kidney, bowels, and skin. Intake and output of fluids is a most important routine and must be shown in a daily consolidated report.

3. All foci of possible infection, tonsils, teeth, kidneys, and bowels, should be discovered and eradicated.

4. Deep breathing by aids to general circulation and by fresh air avoids danger of asphyxia.

5. Free exhibition of alkali-salts and food anticipates acidosis.

6. Veratrum viride by a system devised to lower blood pressure, reduce the pulse, and aid diaphoresis.

7. The emptying of the uterus, as a therapeutic measure, to be done in the way least conducive to shock is indicated as soon as prophylactic measures fail. Every one at all familiar with the toxemia of pregnancy recognizes the marked improvement of the patient's condition following the removal of the products of conception.

In a most illuminating paper on toxemia, J. Young (*Journal Obst. and Gyn. of the British Empire*, July, 1914), claims that hemorrhages or areas of necrosis in the placenta depend on whether vein or artery is affected, and that these result from thromboses in the ovarian and uterine vessels. Toxins are generated in the autolyses of these areas and these Young holds responsible for the toxemia. This theory placed side by side with that of the infectious origin of eclampsia recalls the relation of thrombosis and infection, and also

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the high percentage of toxemia of pregnancy and accidental hemorrhage where a focus of infection may actually be demonstrated.

Young shows that toxemias are due to the liberation of products of early autolysis of placenta because they are associated with recent infarcts of the placenta, which is so constructed that the dying toxins pass directly into the blood stream.

Experimentally, he isolated from the healthy placenta soluble materials which, when injected, caused convulsions and focal necrosis of the liver, and degeneration of the kidneys.

Most eclampsias occur in primiparæ in hydramnios and in multiple pregnancy. These patients are, of course, subject to the greatest pressure and most frequently suffer from asphyxia.

It is to be remembered that in chloroform poisoning and the lesions from certain types of eclampsia, the liver and kidneys are identically involved. From this experimental discovery of Arthur Dean Bevan, which was shown in an address given before the Jackson County Medical Society at the Kansas City General Hospital in 1913, we conclude that chloroform and eclampsia produce identical injuries, and that chloroform, therefore, adds to the danger of the eclampsia and should never be used as an anesthetic in these cases. The fact that the asphyxia from chloroform circulating in the blood increases the lesion suggests that the diet which protects the liver cell in chloroform poisoning should be one generous in carbohydrates and correspondingly low in fats and proteid.

The identity of the kidney lesion of sepsis and eclampsia has long been observed. Martin Fischer in his work on edema and acidosis advises the giving of salts which best overcome edema, as acidosis is quite frequent.

In eclampsia, we can see why magnesium sulphate is so often resorted to and can understand the reason for its happy results in these cases.

That eclampsia may be due to edema of the brain is the contention of Zangenmeister in writing on edema. In view of the relation of focal infection to eclampsia and preëclamptic toxemia, great stress should be placed on the locating of all foci of possible infection.

The teeth especially should be examined, and these patients should be advised to consult their dentists throughout pregnancy and be under his care. All visible signs of focal infection and destruction must be treated.

If a patient has a history of rheumatism or muscular pains, teeth in which nerves have been killed should be *x*-rayed. Teeth which have been crowned are especially under suspicion. The teeth

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involved should be removed when symptoms of local systemic absorption are observed. To avoid the severe auto-vaccination resulting from the removal, the teeth should be extracted one at a time. All these measures constitute prophylaxis and may prevent toxemia, hemorrhage, and abortion.

Since sepsis is found to produce nephritis in the woman not pregnant, how much more likely it is to result in the pregnant patient?

The routine treatment of this group of cases has been milk diet or whey, cereal, sugar and buttermilk, sulphate of magnesia until copious results appear, elimination by liberal quantities of water, rest in bed, and means of inducing sleep in the preëclamptic subjects.

Blood pressure and eye symptoms, together with intake and output of liquids, are carefully watched and recorded, the latter summed up in twenty-four hours' contrast. If the blood pressure has been persistently over 150, the advent of eclampsia should be expected; and if rapid pulse and headache are also in evidence and the pressure remains at 180, the uterus was emptied. The double benefit of this maneuver is that it not only relieves pressure, but it also immediately provides for the oxygenation of the child by its own mechanism. A method which will cause the least shock to the nervous system and do least damage to the soft structures of the pelvis should be selected. In general, this method is the Voorhees bag inserted after gradual preliminary dilatation by Hegar's dilators up to No. 20, which admits the No. 4 bag, rather than by digital dilatation. We have found these patients peculiarly susceptible to sepsis and if forcible manual dilatation is resorted to, the cervix being torn, not only is the resulting scar an evidence of wreckage of structure, but immediately the parts of the cervix, hanging into the vagina, invite septic infection from the outside and greatly increase the mortality.

Unless these patients die from the results of necrosis of liver or brain, the fatality is usually from sepsis. In fact, one of the two deaths in the recent series was due to infection, the patient having been delivered before coming into the hospital. The first seizure took place one-half hour postpartum. Death followed from general peritonitis and myocarditis.

In the Chicago Lying-In Hospital, the use of hot packs has been abandoned by Dr. DeLee; but we still are using the electric pack, where a dry hot skin with blood pressure of 180 or over indicates the approach of convulsions. Solution of soda bicarbonate by mouth or by proctoclysis is depended on as the fluid to preserve an equilibrium between intake and output. All our patients were

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given ether; in no case was chloroform allowed. Chloral by rectum, as a routine sedative was ordered, as it does not produce poisoning, as does chloroform, contrary to the assertion of some investigators. While an occasional dose of morphine 1/8 and scopolamin 1/200 is given, we do not use the Stroganoff method. LaVake asks the pertinent question why it is not a prophylactic against eclampsia, sepsis, miscarriage, and accidental hemorrhage in the pregnant women? He asserts that he has not seen a case of eclampsia in which a focus of infection and usually a marked one could not be demonstrated.

Krause of El Paso, in a paper before the Jackson County (Mo.) Medical Society, claims that in all the six eclamptic subjects he has conducted postmortems, the presence of the colon bacillus in the kidney was proved; and he associates eclampsia with colon infections, a suggestion to which his laboratory findings give evidence in his experience.

Hopkins Gardner (AMER. JOUR. OBST., vol. lxv, no. i, 1912) conducted experiments which exclusively dispose of the statement that chloral produces the same liver necrosis as chloroform. He demonstrated also the fact that chloral hydrate produces no histologic kidney lesion. We have discarded all anesthetics in the convulsion.

Oxygen in the convulsion has been used as an aid to overcoming asphyxia. No violent efforts should be made to restrain the patient. Magnesium sulphate to free catharsis; veratrum to keep pulse under 80. If the patient is conscious, give chloral, 20 grains, and bromide, 40 grains, by mouth; otherwise by enema, chloral, 30 grains, bromide, 60 grains. Murphy drip, soda bicarbonate, 2 per cent., glucose, 6 per cent., should be ordered. If this is rejected, soda solution by hypodermoclysis, care being exercised to have it sterile. Alternate every eight hours, high colon irrigation and the hot pack, the latter only if patient is absorbing plenty of fluids.

When all other means fail to free the system of toxins, we consider the emptying of the uterus as suggested. No bleeding is done, as it has been found that phlebotomy is no advantage to the average patient. One cannot tell how much blood the patient will lose at delivery. Blood pressure is more effectively relieved by veratrum ♏v–xv, every four hours for pulse over 100, and ♏iii for pulse over 80 and under 100. Cases not bled recover more rapidly than those bled. Bleeding has done harm; veratrum has never been found dangerous in our experience.

With a dilated right heart, beginning edema of the lungs, and high

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blood pressure, bleeding is certainly indicated. If these symptoms are absent, it is not.

As against the Stroganoff method of large doses of morphine, we find emptying the uterus safer. An initial dose of morphine lessens excitement and may be used. When it is employed to slow respiration, morphine increases asphyxia and the danger to the patient in consequence. However, Stroganoff has some very wonderful and attractive statistics in favor of his treatment. Dr. E. G. Zinke of Cincinnati, has long been a champion, with Hirst, of the conservative handling of eclampsia, discouraging the emptying of the uterus as meddlesome midwifery. Our results, however, we believe, justify us in our technic.

There is one class of cases which are peculiarly dangerous, and in which it must be recognized that the induction of labor or any waiting policy is not to be trusted. This is the fulminating type in primiparæ where one convulsion follows another in rapid succession. If in these patients the cervix is hard and long, the severe effects of continued pounding labor must force the toxins into the blood stream so violently that the resistance is broken down through the accession of the toxemia, and the patient will probably die if she goes over three or four hours. In case the cervix is not softened, the delivery in this case should be by Cesarean section.

Our duty to these women is twofold. First, we want to spare their lives; and second, the dictates of the Catholic Church as well as those of humanity appeal to us to spare the lives of the unborn children as well as of the mothers who are imperiled by the overwhelming storm of toxic material which so rapidly menaces both victims.

Now, having decided to empty the uterus, we have reached the following conclusions as to method. The Voorhees bag is introduced by a routine technic. We find this means of dilatation less likely than any other procedure to injure the soft structures of the patient or to be followed by shock or sepsis.

If the cervix is not softened, we must choose, on the one hand, between *accouchement forcé*, a dangerous expedient producing shock and laceration and inviting infection, and on the other, a Cesarean section with the added risks involved by the hysterectomy which are by no means inconsiderable. In 1916, Dr. Franklin S. Newell of Boston, recorded the results of 100 Cesarean sections within 40 miles of Boston, not from published reports, but from private information; and the startling discovery is laid bare that where patients have been subjected to repeated examination and frequently

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ineffectual attempts have been made to use forceps and to do version, when this treatment is followed by section, the mortality is practically 100 per cent. It is, no doubt, from such figures that Rudolph Holmes has grounds for his warning against indiscriminate Cesarean section as a last resort. It has its place as a selected procedure in certain identified cases of eclampsia, but even they are limited.

The Voorhees bag introduced by the method mentioned has seldom failed to do the work. We have never had a rupture of the membranes from it nor have we had a resultant sepsis. The choice of method must, of course, be determined by the condition of the patient and the experience of the operator.

Prophylaxis and early treatment are the keynotes of success. If the patient is under observation early, it is believed that brain and liver necrosis, infarcts of kidney, and dangerous sequelæ of toxemia may usually be avoided. A diet of milk, cereals and fruits should be ordered. Full movements of the bowels are to be encouraged by 1 ounce magnesium sulphate and six to ten glasses water, daily.

If symptoms persist, we advise keeping patient in a well-ventilated room with sunshine. She is directed to change her position, lying, sitting, prone, lateral, and knee chest, using calisthenics and massage for exercise. The dental treatment should be continued at home, if necessary. As a diuretic, imperial drink may be ordered; cream of tartar, dr. 3, milk sugar, dr. 4, lemon juice, 1 ounce, dissolved in 3 pints of boiling water. This should be given if water becomes distasteful. If patient tires of milk, she may have cereal, whey, and sugar diet with buttermilk. The object of this plan is to give a high carbohydrate diet with low fat and just enough proteid to balance and sustain nitrogen equilibrium.

According to experimental research by Opie and Alford, carbohydrates have a favorable influence on pathologic states both from toxemia and chloroform poisoning. Fats have a bad effect, as also has proteid. Wash out bowel daily with 2 per cent. soda bicarbonate solution in the knee-chest position; assure plenty of sleep. When the blood pressure, which should be always observed and recorded, remains over 160, the patient is in danger. If it remains over 180 for even a limited period, she is menaced; and at 200 she should be delivered at once.

The albumin index is to be watched and the test-tubes kept in series so that the percentage can be noted daily. If the heat and acid test shows 40 per cent., the condition is considered critical.

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If it is 85 per cent. when first seen the uterus must be emptied in twenty-four hours, tentative treatment with magnesium sulphate and fluids being tried, if pulse stays over 90 and pressure over 160. It is always to be borne in mind that these patients are peculiarly prone to sepsis, and that the danger of interference is to be considered. Of course, eye disturbances and heart changes are also positive indications.

The patient with eclampsia two months before her time is liable to die if the symptoms do not clear up after prophylactic measures; and she should always be in the hospital and under close observation.

Concerning toxemic vomiting of pregnancy, six cases have been under treatment. It is a melancholy picture that confronts one on looking back to the old empiric plan, or lack of plan, by which these unfortunate subjects were managed. The lighter type finally came through, while the more profoundly poisoned victim either had to submit to therapeutic abortion or wait for a fatal termination. To Dr. John C. Hirst is due the credit for bringing to the profession the suggestion of corpus luteum in pernicious vomiting.

The following typical cases are presented herewith for discussion:

CASE I.—Mrs. T., wife of a mining engineer of Bartlesville, Okla., had twice before been a patient of the writer. Each time it was thought necessary to empty the uterus after an ineffectual trial of means at hand to relieve her condition by less drastic measures. Being especially eager for a child, Mrs. T. came to the hospital last summer and was put to bed for the month in the second month of her pregnancy just as the nausea and vomiting were becoming intolerable. She was given a drachm bromide of soda and 30 grains of chloral by enema to quiet the nervous excitement. Afterward this dose was reduced to 40 grains of bromide and 20 grains of the chloral, p.r.n. was continued.

Corpus luteum extract was given by hypodermic 1/3 c.c. on alternate days, with 1/5 c.c. thyroid extract on the succeeding day. This dose was increased to 1/2 c.c. of the corpus luteum, and as the effect of the thyroid or her pulse indicated, the latter hypodermic was abandoned. After two weeks the vomiting ceased and the patient returned home. She went through an uneventful pregnancy, came back to the hospital, was delivered at term of a perfectly normal baby boy, and made a good recovery.

CASE II.—Mrs. C. from Englewood had been in a hospital for three weeks. She had been given morphine and other sedatives unavailingly, and returned home. Her mother, who had been a patient of the writer in her own lying-in days, brought her to the office, and it was decided to put her on the corpus luteum régime. When she was admitted to the hospital the only substance which was retained at the time was "soda pop," of which she consumed many bottles. Many times this was rejected, but no food or other drink

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was retained even for an instant. In two weeks after the corpus luteum and thyroid was begun she returned home, and was delivered at term. She is now apparently well.

Two cases at the General Hospital followed the same history, with equal results. Each cleared up after two weeks in bed with corpus luteum.

CASE III.—On March 12, 1918, Mrs. L. of Okmulgee, Okla., came into the hospital. Her history as to previous pregnancy showed that she had been delivered of a girl baby ten years ago after a stormy experience, the vomiting at times threatening to overwhelm her. Twice subsequently, under the care of two different medical attendants, she was relieved by therapeutic abortion which cleared up the symptoms.

The present pregnancy began in a storm of nausea from which the patient had no relief. She was in bed for four months, coming to the hospital on a stretcher thoroughly exhausted. She was unable to raise her head from the pillow. Vomiting was continuous, and some pain was felt, which had caused such alarm that a doctor was called to the train at Vinita and a hypodermic injection of morphine was administered.

Her blood pressure was 115 and some edema was found when she was admitted. The urine was loaded with casts and albumin, and blood persisted in each specimen for the first week. Under a restricted diet, absolute rest in bed, corpus luteum and thyroid extract, bromide and chloral by enema to quiet nervous excitement, the patient gradually improved until she was able to eat what she desired, and strong enough to leave her bed. She left the hospital and remained at the Muehlebach Hotel until her accouchement in May. Mother and seven pound daughter returned home in June and are reported as doing well at this time.

CASE IV.—Mrs. B. of Kansas City, Kansas, was referred for treatment after a month in bed under ordinary methods of drug therapy. Owing to an aggravated insomnia and extreme nervous condition, it was difficult to accomplish results during two weeks. The dose of corpus luteum was increased from one-half an ampoule on alternate days to three doses a day of 1 c.c. each. By the third week, relief was very noticeable, and the patient left the hospital at the end of a month. She was able to retain food and was not disturbed by nausea or vomiting. Her medical attendant informs me she is now apparently going through a normal pregnancy all toxic symptoms having subsided.

This remarkable series of cases while only six in number, is all that have been met in the past year; so it shows 100 per cent. of success. Of course, one admits it may have been through good fortune that these results were obtained, but one must remember that they included the cases in series; and what is of more importance, in two of them abortion had been done twice before because it was feared that the life of the patient was in grave jeopardy.

Some better plan may be devised for treating this type of toxemia; but up to the present it is certain that none has produced in the

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hands of the writer such signal success in results. Cases of preëclamptic toxemia and eclampsia are the following:

CASE I.—Mrs. O., a para-i, aged thirty-two, wife of an army captain, was seen in consultation with Dr. Lothian at 5.30 P. M. January 1. She came from Camp Doniphan, where she had been under treatment which was unsatisfactory, because of the lack of laboratory facilities and proper food, as well as hygienic means to combat the toxemia. On entering the hospital the patient presented a pathetic picture; she was semiconscious and suffering from general edema which had invaded the larynx and the glottis and caused a whistling breathing resembling that of a child with croup; amblyopia, unilateral headache, epigastric pain, nuchal pain, blood pressure 240 mm. of Hg., pulse 122, urine loaded with albumin, hyaline and granular casts, scanty, and of high specific gravity.

After salines the bowels were emptied and the blood pressure was reduced by veratrum viride ♏x to 186 and the pulse to 96. She had a comparatively quiet night, and gradually improved for ten days; but on January 2d, her urine showed albumin 4+, but neither hyalin nor granular casts. Blood pressure went up to 200 and pulse to 102. Veratrum ♏x was followed by a drop in the pulse to 86 and in the blood pressure to 178. No headache, but patient was perspiring profusely. At 9 P. M., another ♏x of veratrum was given and the blood pressure recorded was 122 and pulse 68.

The Voorhees bag was introduced at 6.30 A. M. January 13, and pains began at 10.30. The cough from the edema of the glottis returned, and the patient resumed retching and vomiting and became very restless. Veratrum ♏x was given and the recorded blood pressure 132. At 12.40 noon the blood pressure was again 196, and at 2.30 veratrum ♏x was followed by blood pressure of 150. Pains every three minutes and lasting thirty seconds. The bag was expelled at 2.50. At 3.10 a hypodermic of morphine sulphate 1/8, and scopolamin 1/200 was given and at 3.35 the recorded blood pressure was 138. She was delivered at 4.52 when the blood pressure was 150, pulse 66, fetal heart 152.

The placental delivery was slow, as it often is in these cases, and expulsion occurred after 1/2 c.c. of pituitrin at 8.45 P. M. The pulse remained slow, and the perspiration very profuse, as it is often observed after ether. The baby, which weighed 5 3/4 pounds, and was at the seventh month, was kept alive by the breast milk of other mothers in the hospital, but finally expired in the third week, evidently from the effects of maternal toxemia which it could not throw off. Vision gradually was regained and Mrs. O. could distinguish persons and colors after the tenth day. The blood pressure fluctuated between 130 and 180, pulse averaged 90, and respiration 20. She left the hospital February 6. On March 30, Mrs. O. called at the office and requested permission to return to Camp Doniphan to remain until her husband should start overseas. Vision was good, no headache nor other disturbances. May 5, Mrs. O., was apparently well, blood pressure normal, urine negative.

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CASE II.—The wife of Dr. P., aged twenty-six para-i, had been under observation throughout her pregnancy. At various times albumin and casts appeared, with eye symptoms, epigastric pain, general edema, unilateral headache, and all the classical indications of eclampsia; but at no time over two of these appeared simultaneously; and at no time was there any rise of blood pressure over 130. She readily responded to restricted diet and fluids. On each Sunday the bars were down, but the six days diet was rigidly observed. Her delivery was uneventful, and no toxic symptoms have appeared since her return home. The daughter is a healthy specimen, now six months old.

CASE III.—Mrs. N. C. came from Toledo, Ohio, and was seen in consultation with Dr. Buford G. Hamilton, on February 10, 1918. Para-i, aged thirty-eight; blood pressure on admission 138; headache; spots before the eyes; ratio of intake to output of fluids 1:63. Has shortness of breath; epigastric pain. Bag induction was done on fourth day after prophylaxis was begun. A living baby was born voluntarily after twelve hours labor. No convulsions were experienced. On dismissal blood pressure was 124; ratio of output to intake less than 1. Patient has since reported in good condition.

CASE IV.—Mrs. P., aged twenty-three, para-i, the wife of a young railroad contractor, had been a patient from the beginning of her pregnancy. Several times she showed traces of albumin, and on that account she was on a restricted diet throughout her pregnancy. Her blood pressure ranged between 110 mm. and 120 mm., and she was always apparently in good condition with the exception of the albumin. The urine was examined and found negative on Friday, February 22d, and her blood pressure measured 120. Saturday forenoon, the 23d, Mrs. P. called up and reported a headache, for which phenacetin was ordered, and the patient was requested to report her condition by evening. At 6.30 P. M. the telephone report came that Mrs. P. had fainted at dinner. On reaching the house in fifteen minutes, I found her on the floor of the dining room, unconscious and limp. No history of any convulsive seizure could be elicited, but the family was at once warned that she was in imminent danger of spasms. While a mouth gag was being improvised the first seizure occurred. The ambulance was ordered and responded immediately. In the meantime the patient was placed in bed, and in twenty minutes had the second seizure. She was in the hospital in forty-five minutes and a rectal examination disclosed a long hard cervix; no sign of labor, blood pressure 200, patient still unconscious, an urgent Cesarean section was decided upon and was done by Dr. B. L. Sulzbacker. The patient made a very gratifying recovery, and the baby was at no time apparently disturbed by the precarious experience of his mother. Both patients are now normal.

In this case the long hard cervix, the fact that three convulsions came unexpectedly in less than an hour, and the almost complete suppression of urine, led to the conclusion that a section was the only chance for a living baby, and gave the mother the greatest

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advantage by relieving her from the burden of oxygenating the fetus under a handicap, and also did away with the toxic foci which the placenta and the fetus doubtless constituted.

The welfare of the mother was a clear indication to the writer for a section, rather than to allow her to waste her life in an ineffectual attempt to relieve herself of the pathologic burden of the toxemia, and the physiologic burden of the fetus which she must simultaneously attempt.

CASE V.—Mrs. J., para-i, pregnant five months, wife of a minister, referred by Dr. Clark of Wichita, was under observation for six weeks, with no abnormal indication. Blood pressure was normal, urinary findings negative, and the case an ideal one, it seemed, until a violent headache developed and symptoms of eclampsia and abortion were apparent. Dr. Harry Jones was kind enough to see the patient in Rosedale, as the writer was engaged in another case. She was given a hypodermic of morphine, ¼ grain, and sent into the hospital. The following picture presented itself: both hyalin and granular casts; right unilateral frontal headache; epigastric pain; general edema, cough, and vomiting.

Magnesium sulphate and veratrum were at once administered, and the patient put into a hot pack. Blood pressure dropped to 160 and pulse to 70. After three days the patient was running a pulse of 90 and a blood pressure of 160 to 180. The indications showed no fetal heart beat; and no fetal movement was found after repeated examinations; it was believed that the fetus was dead.

The Voorhees bag was used as the best means of emptying the uterus, and labor followed in sixteen hours, a stillborn female infant at the sixth month being delivered. No further convulsions occurred, and the patient went home on the eighteenth day apparently free from evidence of the toxemia. A recent report gives her condition as quite satisfactory.

CASE VI.—Mrs. S., aged thirty-two, para-iv, wife of a lawyer of Webb City, Mo., came November 15, 1917, for her fourth confinement, and, as at each of the former, with a toxemia. Headache, visual disturbance, blood pressure 145; urine showing albumin, hyalin and granular casts. Neuralgia of the face, which was traced to a pyorrhea, resulted in infection and absorption, which were relieved by extraction after an *x*-ray picture showed the point of necrosis.

As the pain and edema with insomnia persisted, the patient was sent to the hospital; McDonald 36; blood pressure 150. Induction of labor was done at 9.30 P. M., and pains began at 10.20. She was taken to the delivery room at 11 o'clock, and after labor terminated, was removed to her room at 12.15, two hours and three quarters later. Symptoms all cleared, and patient returned home in three weeks. She is now apparently well.

CASE VII.—Miss M., aged sixteen, para-i, was seen at St. Vincent's hospital, where she had been for six months; during the last

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two months she was under the care of Dr. B. G. Hamilton. McDonald was 33, blood pressure 170, urine showed albumin, hyalin and granular casts. On account of her religious convictions, no active treatment was instituted. She was in labor forty-four hours with an R. O. P. and was finally delivered with Scanzoni forceps, of a fetus weighing 5¾ pounds. The patient was thoroughly exhausted. She left the hospital still showing hyalin and granular casts. Undoubtedly the bag induction would have spared her some of the long suffering.

CASE VIII.—Mrs. N., para-i, aged forty-two, came into the hospital at the sixth month, having had false pains which were quieted by morphine. Her blood pressure was 120, and the urine findings were negative. She left the hospital with friends and took an automobile ride in the afternoon. At 3.00 A. M. she went into convulsions, having three before entering the hospital and two subsequently. As examination showed a long hard cervix with no softening, it was decided to do a Cesarean section. The uterus was studded with small fibroids. The patient made a perfect recovery. After two weeks she had no symptoms. The baby lived six hours.

CASE IX.—Mrs. E., aged thirty, para-ii, entered St. Vincent's with a blood pressure of 240 which had continued for six weeks. Daily examination showed no trace of albumin or casts. The day before delivery, which was normal, a trace of albumin appeared. Her treatment was magnesium sulphate and veratrum which did not effect the height of the blood pressure. She was delivered of an 8-pound baby and left the hospital with a normal blood pressure and no pathologic urinary findings.

CASE X.—Mrs. D., aged twenty-two, para-i, came from Colorado and entered the hospital on April 8, 1918, under care of Dr. B. G. Hamilton. Her blood pressure was 200, and she had marked disturbances of vision. A specimen of her urine from a week before had been negative, and blood pressure 124. She thought the visual disturbance was caused by the fact that she had broken her glasses, and by the edema due to pressure from the uterus. We found the McDonald measurement 36, and her history showed her to be at term. She was given the usual prophylaxis, and put into a hot pack. The pains began voluntarily and she delivered herself with no artificial assistance. The blood pressure fell to normal and remains unchanged. Urine is negative, but she still complains of some headache.

CASE XI.—Mrs. B., aged twenty-six, para-ii, was seen with Dr. B. G. Hamilton, March 25. One week before, the doctor found albumin, but no casts in the urine, and a blood pressure of 120. On admission the blood pressure was 180, pulse 90, urine showed albumin, hyalin, and granular casts, and was scanty. She had right unilateral headache, red spots before the eyes, and epigastric pain. Blood pressure rose to 190. An induction was done after prophylactic treatment failed to hold symptoms in check. After the bag was placed, the blood pressure dropped to 150. She was

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delivered in eight hours. Both mother and child left the hospital in good condition. On examination, the baby's urine showed albumin for three days, as it does in many of these cases. No albumin in urine of mother or child on discharge.

CASE XII.—Mrs. A., aged twenty-four, para-i, entered the General Hospital at the sixth month of pregnancy, passing in twenty-four hours 1 pint of urine, showing albumin, hyalin, and granular casts. After diet and prophylactic treatment the patient went home, all symptoms having subsided; nor did they return. At term, she came into the hospital again and delivered herself voluntarily without symptoms of toxemia. This patient had previously undergone two surgical operations, an appendectomy and a fixation.

CASE XIII.—Mrs. S. K., a para-iv, came into Ward Three, the maternity department of the General Hospital March 12, 1918, after having had twelve convulsions and being comatose and edematous, with a blood pressure 240. Hot pack, veratrum and magnesium sulphate were at once utilized, and the symptoms subsided. The patient was discharged March 31, in good condition. Dr. Hamilton recognized the patient as having been seen twice in her home in eclampsia. All the babies were born alive.

CASE XIV.—Mrs. G., para-i, aged forty-two, in eighth month was referred by Dr. E. H. Miller of Liberty. She was admitted at 4 A. M., coming by ambulance from her home. Patient was having convulsions in rapid succession, had general edema, which, on invading the glottis, caused a breathing resembling that of a child with croup. Her blood pressure was 220; pulse 120, and temperature 101.8°. Although the cervix was softened, no effective labor was yet begun. No fetal heart, and no fetal movements could be ascertained. The routine induction of labor by Voorhees bag was done after veratrum, ♏x; croton oil, ♏ii, by catheter into the stomach and sulphate magnesium 1 ounce by lavage also. Veratrum was repeated at 6 A. M., and blood pressure dropped to 160 at 7.00; it was 190 at 8.00, then 180, and at 9.15 it was 195. Veratrum at 9.15 and blood pressure at 10 was 185. At 11.00 it was 200 and at 12:00 no change. At 1.00, after the hourly exhibition of veratrum, it dropped to 140. Vision was dim, although patient was now rational. Vomiting and convulsions were persistent. Proctoclysis of soda bicarbonate 2 per cent.; and glucose 5 per cent.; were given. The twenty-four-hour intake was 1330 c.c. and output 5.50 c.c. At 6.45 a stillborn fetus was delivered; weight 5 pounds 6 ounces. The placenta was delivered. Her blood pressure ranged from 160 to 220 after the delivery, and the intake and output would stand 1700 c.c. to 1640 c.c. whereas before delivery, intake and output was only one-third of recorded intake. Sodium phenol phthalein test for efficiency gave a very low response. On Nov. 17, the patient was up in a wheel chair. She was very cheerful and invited the doctors and nurses over to Clay County for a chicken dinner at an early date. Her pulse was 88.68 and 76; blood pressure 180; intake 1860; output 1600 c.c. She was apparently convalescent and prepared to return home next day. Without warning the blood pressure went to 200.

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Kidney secretion was completely suppressed, the patient became comatose, and expired. This was evidently a case of eclampsia grafted on a chronic nephritis.

CASE XV.—Mrs. P., para-i, entered hospital February 26, with a blood pressure 180, urine showing albumin, hyalin, and granular casts. She was given magnesium sulphate and a large quantity of fluids, and was put in the pack. The blood pressure remained between 160 and 190, and the albumin constantly increased. Vision was much impaired; vomiting and diarrhea persisted. She was prepared for a Voorhees bag induction of labor, which was done on March 1. Labor began in four hours, and the patient was delivered in nineteen hours voluntarily. She left the hospital the third week; the symptoms showing but slight albumin.

CASE XVI.—Mrs. J. B., para-i, aged twenty-five, admitted March 31, with blood pressure 200. No other symptoms. She went into labor voluntarily, was given veratrum ♏x, and magnesium sulphate ℥i. She delivered herself after three hours, and her blood pressure fell to 160—in five hours to 130. The urine on admission showed albumin 4 plus diacetic acid and indican. Her recovery was uneventful. On dismissal blood pressure stood at 118, and pulse 90.

CASE XVII.—Mrs. H. S., aged twenty-six, para-i, was admitted February 17, 1918, at 2 A.M., having been delivered at home by Dr. W. M. Sams, who was her attending physician, and who assisted throughout the case. She developed convulsions three hours postpartum. Eight convulsions were suffered before she reached the hospital, unconscious, with blood pressure 150, pulse 100, and temperature 103°. The patient improved under the routine treatment. She became conscious and was apparently convalescent when symptoms became aggravated, peritonitis developed, and septic myocarditis set in. A severe ophthalmia had sprung up, affecting the left eye, and the pus, on being cultured, gave a positive Neisserian reaction, as did also the vaginal discharge. Doubtless the septic myocarditis from which she finally succumbed could be traced to the Neisserian infection, proving, as Dr. LaVake maintains, that all eclampsias may be accounted for by some infection if we can but find the source.

CASE XVIII.—Mrs. H. L., para-i, a college woman, aged thirty-four, McDonald 36 ½, Ahlfeld 27 ½, was seen in consultation with Dr. B. G. Hamilton. She entered the hospital April 18, 1918, and although seen frequently at home, with no evidence of toxemia but slight headache and some difficulty in sleeping, it was found on admission that marked symptoms of eclampsia were in evidence. Blood pressure was 200, pulse 62, unilateral headache, disturbed vision, and insomnia were marked. The blood pressure dropped to 160 and ranged back to 200. Intake 1710 c.c. output 1560 c.c. Patient became very restless, as well she might, carrying the burden of an eclampsia, a right occipitoposterior position, added to a mitral heart lesion. Labor was induced, and every two minutes the patient was having pains lasting a minute. The bag was expelled and dilatation tolerably well established, but rotation had not taken place

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when the patient developed a terrific convulsion lasting two and a half minutes. She was at once put under ether anesthesia and delivered by Dr. Hamilton by version. The baby was stillborn, a condition evidently the result of the maternal toxemia and the convulsion. The mother is today apparently convalescent, no further symptoms having arisen, and the blood pressure being 124 mm.

It would be a needless waste of your valuable time and simply a repetition to enumerate further the cases which go to make up this very remarkable list which now reaches the number of forty-four individual instances of pregnancy toxemia since May, 1917, and twenty-three of them since January 1, 1918.

One can hardly see how such an experience as this can be accounted for, as has been said, one ascribes the prevalence of these toxemic explosions to climate or atmospheric loss of equilibrium, as has been claimed by Dr. E. H. Miller. Several years ago, he read a paper on epidemic eclampsia, and recently told the writer as an evidence of epidemic herpes zoster that he had during the past winter seen and treated nine cases of shingles in his own practice. Whatever opinion one may hold as to the etiology of these toxemias, one is struck by the fact that the results of a system of routine examination and laboratory reports, including urinalysis and the estimation of kidney insufficiency by the sodium phenolphthalein test, which is now being done as a routine; the careful record of intake and output of fluids; the careful observation of blood pressure; and the treatment by veratrum, magnesium sulphate, hot packs and plenty of fluids, in comparison with other systems, has been found unusually satisfactory. Furthermore, the Vorrhees bag in the hands of the writer has demonstrated itself over a hundred times in the last year as the conservative and safe instrument for inducing labor with the least shock, the greatest accuracy, and, generally, the safest results. These patients are not free from the menace to their lives until they are delivered and the source of the toxins removed.

The results here obtained could not have been accomplished in the home of the patient; and it is emphasized most strikingly by these toxemic cases, as well as by the other obstetric emergencies, that the only ideal environment for their protection is that of the hospital.

To summarize: Toxemia of pregnancy and eclampsia are due to change of metabolism resulting from faulty proteid and fat, from an undetermined toxin from the growing ovum, resulting in infarcts and other pathologic changes of the kidney, liver, thyroid, brain,

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and spleen. These toxins are thrown into the blood stream, the products of autolysis of placenta infarcts from which dying particles are carried to the kidney, liver, etc., and cause focal necrosis. Hyperthyroidism is only an incidental evidence in the vicious circle.

The extra burden thrown on the mother of warding off this poison and of oxygenating the fetus overwhelms her powers of resistance. Especially may this result in alternating extreme cold weather and mild days as she is unable to stabilize her powers of resistance. A loss of equilibrium between the centers and periphery of the body causes an acidosis because of the unstable condition of the metabolism. Failure of elimination results in stasis; maternal oxygenation is decreased; lung expansion and heart action are disturbed; asphyxia results; foci of infection in teeth, tonsils, and colon infections may usually be demonstrated in toxemia. Adrenalin output is increased; blood pressure is raised; and blood coagulation is abnormally increased in toxemia.

Consequently prophylaxis, including diet, bland foods, and plenty of fluids, elimination by magnesium sulphate and sweats, eradication of foci of infection are to be planned. Asphyxia is avoided by deep breathing and fresh air. Acidosis is anticipated by alkalies. Blood pressure is reduced by veratrum, not by phlebotomy. All other measures failing, the final resort is to empty the uterus. This should be done under ether anesthesia, as ether is the only safe inhalation anesthetic in these cases, as follows:

1. Preliminary dilatation gradually by Hegar's dilators up to No. 20.

2. Voorhees bag No. 4, if at term, introduced by Reed's method-cigarette roll, held by Pean's forceps. Lavage of soda bicarbonate 2 per cent. after uterus is emptied. Cases of the fulminating type, with long hard cervix (in which no vaginal examination has been done) are best treated by classical Cesarean section.

When, after contamination by frequent digital examination, infection is almost surely to be expected, a Porro or other hysterectomy should be done in the interest of the mother (see Franklin Newel's statistics of results near Boston 100 per cent. mortality).

The results in the series of cases from which these conclusions are drawn, showing 95 per cent. of recoveries of mothers, and 85 per cent. of the children at term, at least warrant the belief that since Tweedy's tables showed maternal mortality of 8, De Lee 20, Williams 25, Cragin 28, N. Y. Lying-In 30; the average American 38; the

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Royal Maternity of Edinburgh 66 (these figures being from De Lee's Year Book, 1918), our results are far above the average, or else our cases have been less toxic than those encountered elsewhere, which is not likely the fact.

From our own experience and from that of other observers, including a most interesting report just received from Dr. Ben Myers, who does a large obstetric work in Alaska, and who finds that during the last year, an unusually cold wet season, 12 per cent. of his cases suffered from toxemia, the conclusion is drawn that the weather does at least aggravate the tendency to this condition. As there is such a close relation between the toxemia and the nervous system, is it not also fair to ascribe to the war an incidental effect as a causative factor?

The moral to be drawn, then, is that pregnancy is a condition in which the patient is peculiarly susceptible to external atmospheric influences, and to psychical impressions which disturb the nervous equilibrium. She should, therefore, be inspired by a cheerful optimism that we are going to win the War, and make the world safe for future generations of freeborn people.

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