OBSERVATIONS ON SIXTY CASES OF HYPEREMESIS GRAVIDARUM

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DURING the past few years a great deal has been written on various aspects of severe vomiting of pregnancy. Bokelmann, Harding, Titus, Thalheimer and others have investigated its etiology. Numerous and extremely diversified methods of treatment have been described as the most effective. There is an increasing tendency to attack the problem from the point of view of the chemical findings in the blood, and renewed attention has been directed to clinical changes known for a long time, in the attempt to adduce an explanation. In general it may be said that at present there is no field of obstetric research concerning which more divergent opinions are held, nor is there any syndrome for whose relief more varieties of treatment are recommended.

Because of these divergences of opinion, it has seemed advisable to study carefully the clinical course and laboratory findings in a large series of cases of serious vomiting of pregnancy. For this purpose all patients admitted to the Johns Hopkins Hospital during the period from January, 1920, to December, 1927, with that diagnosis have been considered. The series does not include patients seen only in the Out-Patient Department and followed through the externe service. Incidence, race, age and parity, time of onset of the disease, loss of weight and changes in temperature and pulse are noted. The urine and blood in each case have been subjected to careful chemical analysis. Finally, the various methods of treatment practiced are considered, together with the ultimate result as far as the outcome of the pregnancy is concerned.

During this period of eight years 48 women were sufficiently ill to be admitted to the wards on account of vomiting. Two of the patients had suffered from this condition during two pregnancies, and one during three, thus bringing the total number of cases up to 52. Moreover, six patients had a relapse requiring a second admission during the pregnancy, and one patient was admitted three times, giving a total number of 60 admissions. Thus it appears that in approximately 13 per cent of our patients the vomiting recurred following a previous discharge from the hospital. Of these sixty admissions, thirty-three were classified as suffering from mild and twenty-seven from severe vomiting of pregnancy, as indicated by their condition on admission as well as by their subsequent course in the hospital.

During the years 1924 to 1927 inclusive, there were 6,491 admissions to the house service, and in 43 cases the patient was suffering from vomiting of pregnancy, which in 16 instances was classified as severe. Thus we arrive at a total incidence of 0.66 per cent, and of 0.25 per cent for severe cases; while Cruickshank found in Glasgow a total incidence of 1.21 per cent, and Costa in Spain 0.05 per cent of severe cases. Our figures indicate that vomiting of pregnancy, severe enough to demand admission to the hospital, occurs about once in every 150 pregnancies.

There is a widespread belief that the negro is less prone to conditions in which the neurotic element plays an important part, as it admittedly does in the one we are considering. We, however, find that in our service, which has slightly more colored than white patients, the forty-eight cases were equally divided, with twenty-four in each race. Private patients comprise less than 15 per cent of the total whites, yet ten of the cases of vomiting occurred in such patients. Experience everywhere seems to indicate the prevalence of the condition in the upper rather than in the lower or middle classes.

Age seems to be an unimportant factor. In our series it varied from 14 to 37 years, the average being 24.35 years. Fifty per cent of the patients were between 20 and 24 years inclusive; while 11.5 per cent were below 20, and the remainder were 25 years of age or more.

Eighteen of our patients were primiparae (34.6 per cent). A neurotic predisposition toward vomiting during a second pregnancy was noted in 14 patients (26.9 per cent) and is probably due to a recollection of the discomforts associated with the first illness. Three patients had had six or more pregnancies, with vomiting severe enough to warrant treatment now for the first time in their obstetric career.

The duration of pregnancy at the time of admission to the hospital varied from four to over twenty weeks, the average being 10.42 weeks, and 71 per cent of the patients were under three months pregnant. On the other hand, one patient had two admissions after the twentieth week, and continued to vomit at intervals up to the time of delivery. It is thought that a definite mental disturbance from which she suffered may have played some part in the etiology of the condition.

According to the patients' statements the duration of vomiting prior to admission varied greatly, with extremes of two days to over two months. Seventy-five per cent had been vomiting less than a month. In many instances a satisfactory history could not be obtained, so that it is impossible to state how long the vomiting had persisted before it became severe. In general, however, it may be stated that there seemed to be no connection between the duration of vomiting and the severity of the case nor its response to treatment.

Seven of our patients definitely placed the onset of severe vomiting at less than twenty-eight days following the last menstrual period. In other words, it supervened before the knowledge of the existence of

pregnancy could play any part in awakening mental or neurotic factors. Seventy-one and seven-tenths per cent of the patients began to be definitely ill prior to the sixth week. In only five did it commence after the eighth week, and in only one of these patients was the vomiting severe, and in her case a preceding pregnancy had been terminated elsewhere for the same cause.

The history as to loss of weight often did not correspond with the general physical appearance of the patient and was said to vary from a very slight loss to one of forty-six pounds. As very few of the patients had been long observed prior to their admission to the hospital, reliable data are unavailable. But in six of the twenty-seven patients in whom it was felt that history was fairly trustworthy, the loss of weight apparently exceeded thirty pounds. Strange to say, none of the six were particularly ill on admission, and all of them responded readily to therapy; while the patient who claimed to have lost forty-six pounds did not vomit after admission. Thus our experience indicates that loss of weight gives no index as to the condition of the patient or to the severity of the disease.

The pulse rate at the time of admission was next studied. Twenty patients (33.3 per cent) had a pulse rate below 100. Of these, eighteen required only isolation, suggestion and dietary regulation to effect recovery, and several did not vomit after admission. Fifteen patients (25 per cent) had a pulse of 100 to 120, and in twenty-five (41.7 per cent) it was above 120. The average for the series was 110. Of the six patients in whom the pulse rate rose above 140, five went on to recovery, while in the sixth, the pregnancy was terminated. Consequently we do not feel that the presence of a very rapid pulse necessarily justifies a gloomy prognosis. Indeed in one of our most stubborn cases the pulse at no time went above 84.

In patients admitted with a rapid pulse rate, improvement was followed by a fall to normal. All of our patients were discharged with a rate below 100 except two, who left the hospital against advice and before treatment was well under way.

It is generally stated that elevation of temperature is of ominous prognostic import, so that an analysis of our experience may be of interest. Thirty-seven (61.7 per cent) of the cases showed an elevation of sublingual temperature to 99° F. or above, and as in them no local or systemic conditions could be elicited to account for hyperpyrexia, it seems justifiable to connect it in some way with the vomiting. Of the twenty-three patients whose temperature was 99° or below, fifteen, or about two-thirds, could be classified as mild, while of the thirty-seven with some elevation, nineteen, or just over one-half, were severe. Thus it seems that severe vomiting of pregnancy is frequently accompanied by fever (as high as 101° F.); but on the other hand it should always be borne in mind that the patient may be severely ill in its absence.

In only one case was definite jaundice seen. In this instance the patient's condition was so serious as to warrant the induction of therapeutic abortion, which was followed by prompt recovery.

Albumin was present in the urine of 40 per cent of the patients in the series. In eight the test was strongly positive, and three of these women showed definite nephritic toxemia later in pregnancy. Acetone or diacetic acid was strongly positive in only nineteen cases, less than a third of the total, and twelve of these, or 63.2 per cent, came under the classification of mild. On the other hand, in twenty of the severe cases repeated examination of the urine failed to reveal the presence of acetone bodies. Casts were found on microscopic examination of the urine in ten cases, over one-half of which were mild. Thus the ordinary urinary findings gave us very little aid toward determining the severity of the disease.

Study of the nitrogen partition of the urine, as determined by accurate chemical examination, did not give the expected results. The ammonia coefficient, or the relation of the nitrogen excreted as ammonia to the total nitrogen, whether determined at admission or during the worst of the vomiting varied greatly, with extremes of 3.5 per cent to 40.45 per cent, the average for the series being 15.35 per cent, which had fallen to 6.79 per cent on the average at or near discharge from the hospital. In thirteen cases, the ammonia coefficient was below 10 per cent, and eleven of these cases were mild. The other two, however, were so severe that the pregnancy was terminated by the induction of abortion, and these are the only cases in our series which required such radical treatment. Thus a low NH_3–N coefficient does not necessarily indicate that the condition is mild. On the other hand the coefficient exceeded 20 per cent in ten patients, and in six of these vomiting was severe but in the other four it was quite mild. Consequently there seems to be a tendency for this factor to follow the severity of the disease, but it can by no means be regarded as an infallible indication.

We now come to a consideration of the changes to be found in the chemical constitution of the blood during serious vomiting of pregnancy. It has been definitely established that certain deviations in the blood chemistry are to be found in normal pregnant women, as contrasted with normal nonpregnant women, although most of the determinations have been made during the last months of pregnancy rather than during the first trimester, concerning which we are particularly interested. From Stander we obtain the following figures:

	NPN	*Uric Acid*	*CO_2*
Normal nonpregnant	32 mg.	3.3 mg.	52 vol. per cent
Normal pregnant	28 mg.	3.3 mg.	45 vol. per cent

Likewise Harding, Killian, Caldwell, Farr, P. F. Williams and Plass find the NPN normal or slightly reduced. Harding noted a rise in uric

acid during the latter months, while Killian, Karl and Rowley report the blood sugar within normal limits.

Our figures obtained by blood analysis in several individuals under three months pregnant who showed no signs of vomiting do not differ materially from those just quoted. We find an average NPN of 34.3 mg. per 100 c.c., uric acid 2.4 mg., chlorides 539 mg., sugar 98.3 mg., and CO_2 combining power 49.8 volumes per cent. In other words normal pregnancy, particularly during the early months, seems to cause very little change from the normal in the five constituents of the blood mentioned, with the exception of the sugar, which will be discussed later. On the other hand, as will be indicated, some of them are frequently materially altered during severe vomiting of pregnancy.

Stander, Harden and Guffey, Gonnet and Reboud, and Killian and Sherwin have all found an elevated NPN content of the blood during vomiting, while Dieckmann and Crossen obtained a reading above 60 mg. in three of the ten cases they studied. In our series of sixty cases, forty-nine had one or more determinations of the NPN content of the blood at or soon after the time of admission, with results as shown in the following table:

NPN below 30 mg.	11
from 30 to 39.9 mg.	24
from 40 to 59.9 mg.	5
at 60 mg. or more	9
	49

Eleven, or 22.4 per cent, showed at no time a figure above 30 mg., the lowest being 16.6 mg. In twenty-four, or 49 per cent, the reading varied between 30 and 39.9 mg. On the other hand in nine of our cases there was a very marked deviation from normal with extremes of from 60 to 150 mg. and an average of 93.8 mg. Eight of these cases were classified as severe and one with a reading of 60 as mild. The average for the entire series is 44.15 mg., or about 10 mg. higher than in the normal early pregnant woman.

The figures obtained by averaging the findings in the mild and severe cases are even more striking. The former showed an average NPN of 33.3 mg. as contrasted with 57.5 mg. in the latter, or more than 23 mg. above normal early pregnancy. We can, therefore, say that mild vomiting of pregnancy has no effect on the NPN, but that severe vomiting definitely tends to elevate it well above normal limits.

There is a similar tendency toward an increase in the blood uric acid. The authors mentioned above as finding an elevated NPN during vomiting also note a corresponding rise in uric acid. J. L. Williams believes an elevated uric acid content of the blood to be indicative of pernicious vomiting, as he did not find it in the neurotic variety. In our series uric acid determinations were made in thirty-nine cases.

Uric Acid below 4 mg.	26
from 4 to 5.9 mg.	7
at 6 mg. or more	6
	39

Twenty-six, or two thirds of the total number, showed at no time a reading above 4 mg. On the other hand in six cases the figure was above 6 mg., with variations from 6.1 to 10 mg. All the cases in this group occurred among the nine cases referred to above as showing a very high NPN reading. The average uric acid content for the entire series was 4.13 mg., a figure slightly above the upper limit for normal nonpregnant and 1.7 mg. above that observed by us for normal early pregnant women. Upon grouping our figures according as the vomiting was mild or severe, we obtain an average of 3.3 mg. for the former, which is near to but within the upper limit of normal. In the latter, however, the average is 6.1 mg. which is well above normal, and rather parallels the rise in NPN.

Haden and Guffey, as well as Dieckmann and Crossen, report a lowering of the chloride content of the blood in vomiting of pregnancy. Hawk places the limits of blood chlorides in the normal nonpregnant individual at 450 mg. to 500 mg., and Stander in normal pregnant women at term obtains a figure at the upper limit, 502 mg. In our series of normal women during the first trimester of pregnancy even higher results were obtained, varying from 486 to 587 with an average of 539.3 mg. Sixteen of the twenty-two vomiting patients in whom similar determinations were made (72.7 per cent) showed a blood chloride content of 450 mg. or above; while two other patients showed less than 400 mg. In both of the latter the vomiting was severe, and one of them required therapeutic abortion. The average for the series was 480.9 mg. Reverting again to a division according to the severity of the illness, we find in the mild cases an average blood chloride content of 497.2 mg. as contrasted with 464.5 mg. in the severe ones, a figure 75 mg. below that of our normal early pregnant patients but still within the normal limits of Hawk.

The blood sugar in vomiting of pregnancy has given rise to some controversy, but it is difficult to compare the figures of various authors owing to the various methods of determination used and the resulting divergence in figures for normal blood.

During the years covered by our series, the blood sugar was determined by two methods. The Folin-Wu method was used up to Feb. 15, 1926, while after that time and continuing to January, 1928, the modification proposed by Benedict in 1925 was employed. The former method indicated that normal blood contained about 90 mg. per 100 c.c.; while the latter method reduced the figure to 75 mg. This is due to the fact that it did away with the precipitation of certain nonglucose-reducing bodies which were carried over by the Folin-Wu method.

Since January, 1928, we have been employing a third method, Benedict's new modification, which we believe indicates still more accurately the true glucose content of the blood and gives a normal reading of about 60 mg.

Thus during our series two methods of sugar determination were used, each giving a different normal figure—that of Folin-Wu 90 mg. and that of Benedict 75 mg. In order to compare our findings in the two series we have subtracted 15 mg. from the results obtained by the Folin-Wu method, and consequently all our figures are given in terms of the 1925 Benedict method with its normal of 75 mg. Our small series of normal early pregnant patients shows a high average blood sugar, 98.3 mg. per 100 c.c. (Benedict). This was an unexpected finding and there is no obvious explanation for it. We believe that more work should be done on this point, as our series is too small to justify a definite statement.

Dieckmann finds a normal blood sugar in the vomiting of pregnancy. Grogan agrees but reports an occasional case in which the sugar is lowered. On the other hand Long, as well as Kuto, finds a hyperglycemia, the latter in eleven cases obtaining an average of 143 mg. Titus, on the contrary, contends that severe vomiting of pregnancy is always accompanied by a definite hypoglycemia.

Our figures obtained from patients suffering from vomiting varied from 67 mg. to 200 mg.

Blood Sugar (Benedict—normal 75)	below 80 mg.	3
	from 80 to 99 mg.	8
	from 100 to 119 mg.	12
	from 120 to 139 mg.	9
	at 140 and above	6
		38

The three readings below 80 occurred in mild cases, whereas the six patients in whom the blood sugar rose above 140 all belonged in the severe group, and included the two upon whom abortion was practiced. In general, it may be said that two-thirds of the patients with severe vomiting had a sugar above 100; while in over half the mild cases it never rose to that level. The average for the whole series was 112.1. Stated in another way, it may be said that the blood sugar in the patients classified as mild averaged 97.8 mg. per 100 c.c., which may be regarded as a good check upon the figure obtained in normal early pregnant women. The fifteen patients with severe vomiting gave an average of 134.1 mg., and in six of them the blood sugar rose above 140 mg. It appears to us that such findings suggest a markedly perverted carbohydrate metabolism whose nature is not yet understood.

The effect of vomiting of pregnancy on the CO_2 combining power of the blood is also not agreed upon. Grogan finds it low, while Haden

and Dieckmann report it increased. Considerable variation in the figures obtained by us likewise occurs.

CO_2 Combining Power under 40 mg.	4
from 40 to 59 mg.	40
from 60 to 79 mg.	4
	48

Four patients had readings below 40 per cent, three of whom were severe; while on the other hand, four patients had a CO_2 combining power of over 60 volumes per cent and three of them were severe. Such observations make definite conclusions impossible, as they appear to indicate that both patients with and without acidosis may be equally ill. Both the mild and severe cases gave an identical average of 48.3 volumes per cent, which is essentially that of the normal controls—49.8 volumes per cent.

The treatment employed on our patients varied considerably, but isolation from friends and relatives was routinely practiced and was usually so rigid as to exclude mail, papers, and flowers. Constant reassurance and a refusal on the part of all coming into contact with the patient to consider her condition in any way serious was also routine. Preliminary starvation for from twenty-four to forty-eight hours was often practiced; the diet varied—liquid, soft, amplified, high carbohydrate, and small frequent meals have all been used. At the onset of therapy glucose or tap water per rectum, subpectoral isotonic saline infusions, and nutrient enemata have occasionally been used. A certain number of cases have received glucose intravenously with or without insulin. In the majority of cases the kind of treatment seems to make little or no difference provided isolation and reassurance are stressed. Twelve of our patients who had vomited constantly at home did not regurgitate once after being put to bed in the hospital. Some of these gave a lengthy history of vomiting and had obviously lost much weight.

For some time we have been using a routine essentially similar to that employed at the Boston Lying-In Hospital. The patient is put to bed in a private room and isolated. She is carefully questioned as to fears or troubles calculated to upset her psyche, a careful physical examination is done to rule out other causes for the vomiting, and she is reassured to the point of the physician making light of her condition. If the patient is much dehydrated she is given tap water per rectum or an infusion. Nothing is given by mouth for twenty-four to thirty-six hours. At the end of that time she is given at hourly intervals from 9 A.M. to 9 P.M. a glass of some fluid, alternating at least three varieties. Milk, chocolate, ginger ale, orange juice, strained broth and other liquids may be used, being guided by the patient's preference if she can be persuaded to state any. During this time the emesis basin,

glasses, and other receptacles are removed from the room, and the nurse enters only at hourly intervals to bring the next ration. Vomiting usually ceases after the first day, rarely does it continue longer than two days. As soon as it is apparent that vomiting has ceased, the patient is placed upon six small meals per day and unlimited fluids, again being consulted as to her desires. She is usually sent home on this diet with orders to report frequently for examination. Our results with this treatment, which has now been in use over eighteen months, have been extremely gratifying.

In our series of fifty-two cases of vomiting of pregnancy all but four have terminated satisfactorily. Two patients were uncooperative and left the hospital against advice shortly after admission. Two patients failed to respond to therapy and abortion was induced. In one instance interference seemed indicated on the basis of a marked nitrogen retention. This patient has since been under our care in two subsequent pregnancies, in each of which similar chemical and clinical findings were noted and ended in spontaneous recovery, so that it may well be that the abortion was unnecessary. The other patient was observed for ten days during which time all types of therapy were employed, including bidaily administration of glucose intravenously. Jaundice developed, and her condition became so critical that abortion was done. The next day solid food was retained, and within a week the patient gained sixteen pounds.

We have been able to follow thirty-nine of these patients to the termination of the pregnancy. Twenty-seven were delivered at term, three of them having toxemias during the latter months of the pregnancy. In two, as stated above, therapeutic abortion was done. Ten patients, or 25.6 per cent, aborted spontaneously at varying intervals after leaving the hospital; a surprisingly large number for so small a series. Of these ten patients one had a complete abortion at home, while the other nine were admitted to the hospital. The specimens obtained from the latter were all subjected to careful microscopic examination. One was a typical hydatidiform mole. Three others showed definite inflammation of the decidua and chorionic membrane. The remaining showed no abnormality to account for the abortion. In the decidua of one specimen, deportation of villi was seen.

DISCUSSION

Despite the large number of women suffering from nausea and vomiting during the first trimester of pregnancy very few develop the pernicious type and require hospitalization. The upper classes contribute a much larger percentage than the lower types of white women; and in general it may be said that colored women are more apt to be afflicted than white women of the same social status. The incidence seems to

be greater in a warm than in a cold climate. Germany and the British Isles are said to have a very low incidence. Several of our white ward patients were of French or Italian extraction. A rather large percentage of patients returned to the hospital following a relapse, but none of these were private patients. Crowded ward conditions necessitate the early discharge of the public patient, in this series often within a week of cessation of vomiting. Two weeks would probably give more lasting results, and if the financial condition of the patient permitted, an intermediary sojourn at some resort between hospital and home would seem to be beneficial.

It is believed in this clinic that the underlying basis for every case of vomiting of pregnancy lies in a toxemic process. This is based upon the fact that in every pregnancy, whether normal or not, histologic evidence can be adduced to show that fragments of chorionic villi and detached masses of chorionic epithelium can be demonstrated in the maternal vessels. In other words there is an invasion of the maternal blood by fetal elements. Normally this foreign protein is broken down by the tissues of the mother and is rendered innocuous. On the other hand, if the process be interfered with, it seems justifiable to suppose that toxic symptoms may develop.

In the majority of cases this leads to few or no clinical manifestations so long as the nervous equation of the mother is in fair equilibrium, but when it is unstable symptoms follow. Consequently, in most such cases nature is able to care for the underlying toxemia if the mental condition can be alleviated. This affords a rational explanation for the satisfactory results attending treatment by isolation and suggestion and justifies the employment of the term neurotic vomiting in clinical parlance. At the same time it must always be remembered that this is a clinical conception and that the underlying cause is always to be found in a toxemic process.

On the other hand in rare instances the underlying toxemia is so intense that such treatment is useless, as organic changes soon develop which will inevitably lead to death if the pregnancy is not interrupted. In exceptional cases in this category the fatal issue may occur within one week, and these represent toxemic vomiting par excellence. Furthermore, when death occurs after an illness lasting for weeks, it is usually attributable to changes consequent upon dehydration and inanition, rather than to lesions directly dependent upon the toxemic process.

A great majority of the cases gave as the time of onset before the eighth week of pregnancy. Seven patients began to vomit before a menstrual period had been missed. It is rather difficult to conceive of a neurotic element causing the onset of trouble in these cases.

A very rapid pulse cannot be used per se as an indication for abortion. A critically ill patient may have a steady pulse below 90. On

the other hand a patient with a pulse above 140 is likely to respond quickly to therapy.

Some temperature elevation is frequently observed, falling to normal as improvement is noted. Body dehydration probably accounts for this finding, very few of the mild cases showing any hyperpyrexia.

Albumin is frequently present in the urine of these patients. It seems to be an unimportant factor, being seen as often in mild as in severe cases. It promptly clears up as the patient improves, and in no undue number of cases is a toxemia observed later in the pregnancy. Acetone and diacetic acid were strongly positive in the urine of only one-third of our cases. Many severe cases with dehydration and a lengthy history of vomiting failed to show the presence of acetone bodies on repeated urinary examinations.

The ammonia nitrogen percentage in the urine is definitely increased in almost all cases of starvation and only in a very small number of cases is an indication of the existence of a severe toxemia. Very high readings usually go with a severe case but by no means indicate a gloomy prognosis. On the other hand our only two cases requiring termination of pregnancy at no time had an NH_3N percentage of over 10.

COMPARATIVE BLOOD CHEMISTRY

	NUMBER OF CASES	NPN	URIC ACID	CHLORIDES	SUGAR	CO_2
Normal Early Pregnancy	7	34.3	2.4	539.3	98.3	49.8
Vomiting (Mild)	33	33.3	3.3	497.2	97.8	48.3
Vomiting (Severe)	27	57.5	6.1	464.5	134.1	48.3

The blood chemistry undergoes marked and rather characteristic changes in severe vomiting of pregnancy. In the mild cases the non-protein nitrogen is unaffected; in severe ones it is definitely elevated, not infrequently over 100 mg. per 100 c.c. A slight elevation of blood uric acid is noted in mild cases of vomiting over that of normal early pregnant women. In severe cases, however, it tends to be very high, corresponding closely to the rise in NPN. A fall in blood chlorides is noted in mild cases, increasing as the case is more severe. A very low reading seems to indicate a very ill patient. Normal salt solution subpectorally or intravenously seems to improve the condition of such patients. The blood sugar is unchanged in mild cases but is definitely elevated in severe ones. No essential change in the carbon dioxide combining power of the blood is noted in either type.

The explanation of these findings is not evident. Blood concentration due to dehydration might account for the high values for NPN, uric acid, and sugar. Liver damage would seem to be indicated by the high uric acid, while an upset carbohydrate metabolism, again possibly

from liver damage, would well cause the hyperglycemia. A tendency to acidosis resulting from a changed hydrogen-ion concentration of the blood due to the continual emesis of the HCl of the gastric juice is the most probable explanation of the lowered chloride content. These changes are apparently the result rather than the cause of the vomiting, since they are not usually present in the milder type of case.

The variety of treatment in the great majority of cases matters little so long as isolation and psychotherapy are stressed. It must be remembered, however, that the occasional case will respond to nothing, but represents a profound toxemia, is associated with changes in the liver similar to those noted in acute yellow atrophy and will require termination of the pregnancy, and that a change for the worse in these cases may come very quickly. We must constantly be on the watch for such cases and must avoid the danger of considering all patients merely neurotic individuals who will eventually recover.

Finally, it appears that a large number of these cases end in spontaneous abortion. It would seem possible that in these cases improvement was coincident with the death of the fetus. However, from the length of time the abortion followed discharge from the hospital, as well as the microscopic appearance of the specimen obtained, this would not seem to hold true in most of our cases.

CONCLUSIONS

1. Vomiting of pregnancy sufficiently severe to warrant admission to a hospital occurs about once in one hundred and fifty pregnancies, and severe cases occur once in four hundred.

2. Women in the upper walks of life are more prone to the disease, but negro women are not immune to it.

3. The age and parity are not predisposing factors.

4. Severe vomiting usually starts before the eighth and occasionally before the fourth week of pregnancy.

5. Neither the time of onset, duration of vomiting, nor loss of weight indicates the severity of the disease nor affords a safe guide for prognosis.

6. A high pulse rate usually indicates severe vomiting but does not necessarily imply a serious prognosis. On the other hand a low pulse may persist in a severely ill patient.

7. Fever due to dehydration is frequent.

8. The presence of urinary albumin is frequent but is of slight prognostic importance.

9. Acetone bodies are frequently absent from the urine in severe cases.

10. A high ammonia coefficient is usually seen, but a low one does not necessarily indicate a mild case.

11. In mild vomiting of pregnancy the blood chemistry is not essentially changed, although the uric acid tends to rise and the chlorides to fall.

12. In severe cases a definite increase in NPN, uric acid and sugar is usually noted in the blood. The chlorides are often considerably lowered.

13. In most patients isolation in a hospital and suggestive treatment will effect a cure, but exceptionally all therapy fails and the induction of labor is indicated.

14. A considerable percentage of patients abort spontaneously some time after cessation of symptoms, a phenomenon which requires explanation and study.

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