

THESIS for M.D.

Subject

PUERPERAL ECLAMPSIA

Its Etiology and Treatment

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PUERPERAL ECLAMPSIA

Its Etiology and Treatment.

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Definition.-

Eclampsia has been defined by Bailly as "An acute disease occurring in women, in pregnancy, in labour or in childbed: often sudden in its onset: rapid in its progress: characterised by convulsions, with loss of sensation and of consciousness: ending in coma." (Parvin).¹

General Remarks.-

This definition does not appear to limit sufficiently the term Eclampsia to those cases, which, displaying a certain train of symptoms and pathological facts, are recognised by most authorities as representing the essential features of the disease. There are many convulsive conditions, liable to occur in the child bearing period as at other times, dependent on various causes--not true Eclampsias--which might fulfil the requirements of such a definition: such, for example, among others as, Epileptic convulsions: Hysterical convulsions:

convulsions: those due to altered conditions of the blood, or other causes, which may develop in the course of acute febrile conditions: those occurring in Anaemia, following say post-partum haemorrhage or lead poisoning: those occurring in Apoplexy, Tumours of the brain and Meningitis: and those, which in the unduly excited condition of the nervous system, inherent on the pregnant state, may be reflexly induced by stimuli--e.g., midwifery forceps-- little likely to produce such a result at other times. At the same time in the present state of our knowledge as to the exact nature of the disease, so vague a definition is probably more applicable than any more definite.

Most authorities agree that the term should be restricted to those cases which display evidence of renal insufficiency and its results. By the older authors it was considered essential that a case should present albuminuria in order to be classed as Eclampsia, and even now this feature is considered by some to be a sine qua non to the recognition of a case as a true Eclampsia. In view, however, of the frequency with which cases do occur, in which no albumin can be found, the more modern authors, and especially the German school recognise two forms of

of the disease; one with albuminuria, and the other without (Runge)². Spiegelberg, however, does not consider that the latter class should be regarded as belonging to the region of Eclampsia at all, but that the term Eclamptiform should be reserved for them.³

Period of Onset.-

The convulsions may appear in Pregnancy, in Labour or in the Puerperium, but their relative frequency in these three periods has been a subject of much dispute.

According to Braun and Weiger⁴ more than half of all cases occur in labour while Bailly⁵ regards pregnancy as the most fruitful period for their appearance.

Winckel⁶ believes that most of the cases occur in the last two days of pregnancy. Again Haultain⁷ gives the proportion of cases in the three periods as follows:- in 316 cases, 62 occurred in pregnancy, 190 in labour and 64 in the puerperium.

In almost every list of cases reported in the Medical papers, one cannot but be struck by the number of

of cases mentioned as occurring at the seventh month or the eighth month. In a recent list by Jardine of Glasgow⁸ four cases occurred at 6 months, five at 7 months, two at 8 months, and only three are noted as full time cases, while in three no time is stated. It is too much to believe that in these cases a majority occurred in labour. In thirteen cases of my own three occurred in labour, one in the puerperium and the remainder in pregnancy. Even in full time cases, since it is a matter of common observation that the fits almost invariably in a few hours induce labour pains, and since the patients themselves are obviously at the time and seldom afterwards, owing to the blank in their memories, able to give any information on this point, it is very difficult to arrive at a definite decision in any particular case as to whether the first pain or the first fit has had priority. The balance of evidence appears to me to give precedence to pregnancy as the period in which the convulsions mostly set in. In the puerperium the convulsions may come on at once, in a few hours or even days afterwards. The risk is probably greatest in pregnancy, less in labour and least in child-bed.

bed.

Frequency.-

The discrepancies in the statistics given by various authorities as to the ratio of Eclampsia to the total number of labours lead one to suppose that in different districts and amongst different nationalities the proportion must vary. It is given thus by different authorities:- 1 in 350 cases Boislinière:⁹ 1 in 300 Hirst:¹⁰ 1 in 500 Klienwächter and Galabin:¹¹ 1 in 600 Korman:¹² 1 in 200 Gazeaux:¹³ 1 in 350 (English and Continental) Leishman:¹⁴ 1 in 500 Haultain.¹⁵

My own experience gave me a much higher percentage, viz., 11 in 920 cases, attended during my residence in the West Riding of Yorkshire. Since this percentage is so much above the average I have thought it worth while to enquire if other men practising in that district have met with a like experience to mine, and information lately sent me from two medical friends there appears to shew that the disease is commoner in certain districts than in others. Its frequency in that district and a possible explanation will be discussed later.

Dr Clarke of Morley gives his recent experience of Eclampsia at the rate of six cases in 661 confine-

confinements. Dr Veale of Drighlinton places his average at three cases in 750 confinements.

Primiparae are much more frequently attacked than multiparae, in the proportion, it is said, of 75%. The disease does not often recur in the same woman. In my cases, though this may be only a coincidence, the disease invariably set in in the early morning. Yet it is a fact, which if it were corroborated might have an important bearing on the Etiology of the disease--a point which will again be referred to.

The disease is probably, with the exception of rupture of the uterus the most disastrous accident met with in obstetric practice. The average maternal mortality has been placed at 30% to 35%, while the life of the child is lost in 50% of these cases.

I. ETIOLOGY.-

The vexed question of the Etiology of this disease has been for many years a burning centre round which speculation has been unusually busy and controversy no less active. Of the manifold theories advanced from time to time to explain its causation and symptoms, not one has been deemed sufficiently convincing to successfully resist the hostile criticism launched upon it from every side, and each in turn has been discarded for a newer theory until confusion has become worse confounded. From the oldest of all theories, one, which in bygone days covered such a multitude of human ailments, the determination of blood to the head, we have arrived by successive stages at the most modern, one might almost say the inevitable, Eclampsia-bacillus which Gerdes believed that he had discovered.

The numerous hypotheses and arguments propounded from time to time to explain the disease are set out in the text-books in such a manner as to lead the student into a hopeless maze of conjecture from which he can hardly emerge much wiser than he entered.

entered. It seems to me that there are certain points in the manner in which the subject is treated in the text-books which tend to make an already difficult subject still more abstruse. These may be referred to under three headings:-

(1) The tabulation of the various hypotheses under separate heads in such a manner as to suggest that each individual theory is intended to be a sufficient explanation of all the phenomena of Eclampsia, when as a matter of fact many of them are simply explanatory of a part of the process, and so complementary to some other theory. In this way one meets with such lists of suggested causes of the disease as The Reflex Theory, The Renal Theory, The Chemical Theory and so on, whereas an element of truth in one, though the theory as a whole may have been disproved, taken with what one knows to be correct in another may enable us to approach a reasonable understanding of the whole subject.

(2) The failure to give adequate prominence to the fact that we are not here dealing with a disease arising in a previously normal condition of health but in a pregnant woman. One cannot help thinking that, if we fail to take a broad and comprehensive view of all the circumstances connected with the

the pregnant state, we are apt to be led far astray in considering the possible effects of any pathological factor operating on a system already prepared to respond in a manner so different from what would have occurred had the system been in its normal condition: and we are thus a little prone to jump to the conclusion that certain pathological lesions, or on the other hand toxic matters introduced into or produced within the body, must necessarily cause in a pregnant woman the same train of symptoms which they would initiate under other circumstances.

All that we know of this condition teaches us that the reverse may be the case. That diseases occurring in pregnancy follow a very different course from that displayed by them under ordinary circumstances has been a matter of common observation. Thus diseases, which, in the non-pregnant woman one would regard more or less lightly, assume in pregnancy, especially towards its end, a very different aspect. Acute diseases, in particular, apart from the contingency of abortion occurring during their course, usually develop much more extreme symptoms in the pregnant state than in ordinary health.

In pregnancy the nervous system is in a highly emotional, surcharged and irritable condition,

condition, particularly liable to respond violently to the application of stimuli, whether nervous or toxic, which may have been brought to bear upon it: or as Barnes¹⁷ expresses it "the emotional affectability of the nervous system at this time is the measure of its convulsive liability." As he remarks, all the generative acts are liable to be powerfully influenced by an emotional element and the pregnant state shews this tendency to a marked degree.

Such sources of irritation as a vaginal examination or a loaded rectum or bladder, suffice in certain cases to throw a pregnant woman into convulsions: and I have myself seen the application of midwifery forceps have a like effect on a woman in whom there was not true Eclampsia.

It is evident therefore, that in the pregnant condition disease may take an entirely unlooked for direction, and I have thought it advisable to emphasise this fact, not I think unduly, because so little prominence is given to it in the text-books on the subject.

(3) The uncertainty which seems to exist as to whether the disease in question is one absolutely peculiar to pregnancy (or labour) or simply a form of the so-called Uraemia modified by its occurrence

occurrence during pregnancy (or labour).

That there is doubt in the minds of many authors as to whether it is a disease sui generis or not is very evident when one reads their remarks on the Etiology of the disease in many of the text-books, for even those who insist most strongly on the distinction between the two diseases, themselves use certain arguments for or against various theories of the disease which have long ago done duty in like manner in the consideration of the Uraemia of Bright; and we thus see the arguments employed for the elucidation of problems in this disease which have been similarly used in another form which is held to be distinct.

It might be well, therefore, to consider here the evidence we have on the points of distinction between Eclampsia and the ordinary Uraemic convulsions of Bright's disease so as to enable us to judge if after all there be any sharp dividing line separating the two diseases.

The point of distinction between the two diseases is held to be the different course followed by the temperature. In other respects the diseases are admitted to be more or less on a par.

It is affirmed in practically every text-book on

on Midwifery that in Uraemia the temperature remains low while in Eclampsia it rises with the convulsions and in proportion to their number and severity.

Now such a statement is not in strict accordance with facts. In the first place the temperature is not always high in Eclampsia. Caix¹⁸ of Paris observed one case in which the temperature did not rise above 99.5, and the same thing has been noted by others. It is possible that the error in regarding Uraemia as a disease without a temperature may have arisen from a comparison of Chronic Uraemia, in which the temperature is often sub-normal, with Eclampsia in which the disease is acute. Fagge¹⁹ in treating of the convulsive manifestations of Uraemia distinctly states from his own observation that the temperature in that disease may reach 102° or 104° or even higher. It certainly falls to normal or lower in the resulting coma.

The rise in temperature is probably due, in part at least, to the violent muscular action evinced during the convulsions, and it is possible that the high temperature of Eclampsia is simply to be accounted for by the rapidity and violence of the convulsions, along with the fact that a temperature is more readily set up in the pregnant than in the non-pregnant

pregnant condition.

As an illustration of the influence of convulsions in raising the temperature of the body one has only to refer to Epilepsy in some of its forms.

Although in ordinary Epilepsy the temperature remains low, we find that in the variety of the disease in which the convulsions follow each other with great rapidity, called by the French physicians the "Etat de mal Epileptique," the temperature is raised to 105^o, or even, as in a case noted by Dr Merson, to 107^o, while Charcot has seen a temperature of 105^o, in a case which has recovered.²⁰ I may say in passing that these facts are distinctly at variance with the statements in the majority of the text-books, in which a certain differential diagnostic test between Epilepsy and Eclampsia is said to lie in the fact that in the former disease the temperature is never raised. From what has been mentioned above it is evident that the proof of the absolute distinction between the two diseases Eclampsia and Uraemia (in Bright) is not so clear as we are led to believe, and that, judging from what we have just seen may occur in Epilepsy in cases where the convulsions rapidly succeed each other, there is no reason why the greater rise of temperature in Eclampsia as compared with

with Uraemic convulsions of Bright may not be merely due to the rapidity and severity of the convulsions in the former disease, for we know that the temperature does not rise till after the first convulsion, and that it rises progressively as the convulsions succeed each other. It is this progressive rise of temperature which is so characteristic of Eclampsia, but this solitary symptom does not seem enough of itself to raise the ailment to the position of a distinct disease.

The CAUSES of ECLAMPSIA fall to be considered under the two headings (1) Predisposing Causes and (2) Determining Causes.

(1) Predisposing Causes:-

Some of these causes pertain to or are dependent upon the pregnant condition; others act independently of that condition. An important predisposing factor in the disease is primiparity. It is said that primiparae are more frequently affected than multiparae, in the proportion of five to one. Twin-pregnancy greatly increases the liability to convulsions; and hydramnios has a like tendency.

In the case of primiparae it is probable that the mental anxiety experienced by these women may have some influence in producing liability to the disease. The fact however, that it occurs frequently in these women taken along with the admitted proneness to the disease of women pregnant with twins suggests the possibility of another factor. The greater rigidity of the abdominal walls in primiparae has the effect of producing a higher degree of intra-abdominal pressure, than is the case in multiparae. In the latter, as in hydramnios, this pressure is also

also increased by reason of the unusual size of the uterus.

The temperament of the patient appears to influence to a very considerable extent the tendency to Eclampsia. Whatever may be the nature of the stimuli directly inducing the convulsions, toxic or reflex, it is plain that the state of the nervous system receiving these impressions must have a powerful effect in determining the results produced by them. The last case which occurred in my own practice was in a highly neurotic woman, whose mental condition had some time before given rise to a good deal of anxiety. In my own experience Chronic Plumbism has apparently had a decided influence in favouring Eclampsia. In a district in Yorkshire where I formerly practised, lead-poisoning from contamination of the drinking water was exceptionally rife; to such an extent that over 400 cases passed through my hands in a little over two years. My average of eclamptic cases about that time, was far beyond what is usual, being in the proportion of over one per cent. A considerable part of my practice lay in a district having another water supply in which no case of Plumbism ever occurred; and there I never had a case of Eclampsia. Some of my neighbours there I have since ascertained

ascertained had also an unduly high proportion of Eclampsia.

National peculiarities appear to influence the tendency to Eclampsia, for the ratio of cases seems to vary in different countries, American text-books for example placing the average at 1 in 300, while German writers place it at 1 in 500, or 600.

(2) Determining Causes:-

A very large number of theories has been advanced by various authors to account for the symptoms of this disease; and although an attempt will be made here to give a clear account of the various hypotheses, and of the proofs which have been advanced in their support, with concurrent remarks on the reasons for their abandonment, the older theories which have been long ago discarded as untenable will only be shortly indicated.

The older obstetricians, having regard to the obviously cerebral character of the symptoms, considered the brain solely responsible for the symptoms of the disease, which they thought to be due to congestion of, and over-flow of blood to, the head with effusion on the brain. The frequency with which the brain and spinal cord were found deeply congested,

congested, often with Ecchymosis in the substance of the brain lent colour to their beliefs.

Were such a condition the cause of the disease the symptoms would be much more of an apoplectic character, and it is agreed on all hands now-a-days that these post-mortem appearances in the brain are simply the result of the convulsions.

The Traube-Rosenstein theory which next comes for consideration assumes that the blood in pregnancy, which is usually hydraemic in character, may, in any condition which greatly increases arterial pressure, for example a labour pain, produce in the brain an acute oedema. The serum transuded by compression of the vessels in the brain was thought to produce an intense anaemia of the deeper parts of the brain, that of the bulb giving rise to convulsions, that of the cerebrum, coma.

Each argument supporting this theory has been found to be untenable. The serouseffusion essential to the truth of the hypothesis has been proved to be entirely absent in many cases, the brain being quite dry. Hecker²¹ has further urged against this view of the disease these objections:- (a) that hydraemia occurs so often in pregnancy that were this the cause of the disease it could not fail to occur much oftener

oftener than it does: (b) the arterial tension may occur in labour but not in pregnancy: (c) the oedema of the brain, when it exists, is much more likely to be the effect of the convulsions than the cause.

Angus Macdonald, finding congestion of the meninges and engorgement of the venous sinuses with intense anaemia of the deeper parts of the brain, believed that the anaemia was produced by a toxic substance in the blood. This theory is dismissed in very few words by most authors, why it is difficult to say, since it appears to be almost identical with present day views as to the production of one part of the process involved in the setting up of the convulsions. It cannot be regarded, however, as anything like a complete explanation of the whole condition.

Tyler Smith advanced the view that the nervous system is the starting point of the disease; that it is, in fact, a reflex neurosis. He believed that the brain and spinal cord being previously rendered excitable by stimulation along the uterine nerves, further stimuli transmitted by these or other nerves were sufficient to excite convulsions. Eclampsia may occur however, when the uterus is in complete repose before labour or after it, and in any case

case such a cause is not sufficient to account for all the phenomena of the disease.

The foregoing theories have not been treated at great length because it is quite evident in the light of the knowledge we have had from recent investigation that, whatever amount of truth there may be in them, none of them can be regarded as explaining more than a portion of the process involved in the development of the morbid state resulting in eclamptic convulsions.

For many years, and until quite recently, the view generally accepted as the most rational explanation of the disease has been that the symptoms are caused by a toxic state of the blood, associated with, and dependent upon, renal insufficiency.

In later years the almost constant association of albuminuria and other evidences of renal failure with Eclampsia had already attracted attention and gradually the belief gained ground that the kidneys were the primary source of the mischief. It was noted that in a large number of cases various premonitory symptoms pointing to insufficient performance of the renal function almost invariably preceded the onset of the convulsions; such symptoms as oedema of the hands and face; scanty, highly albuminous urine; frontal headache, giddiness and disorders of vision, symptoms practically identical with those found in renal disease under other circumstances. It was supposed, further, that as a result of this defective action of the kidneys.

the course of its metabolic processes, or by faulty metabolism, were retained in the system in abnormal quantity and that these were the exciting causes of the convulsive attacks.

Albuminuria as a complication of pregnancy was first pointed out in this country by Lever,²² and the accuracy of his observation has been abundantly proved, although statistics shew a curious discrepancy as to its frequency, some placing the average as high as 30% (Gillette)²³ and others as low as 2% (Guy's Hospital Reports)²⁴. It is certain, then, that albuminuria in moderate degree is of frequent occurrence in pregnancy, and this has been held to indicate a tendency to failure of the kidney functions in a large proportion of pregnant women. It is significant that its presence is much commoner in primiparae than in multiparae, while according to Litzman²⁵ its occurrence is the rule in twin-pregnancy.

It would be a rash assumption that so large a proportion of pregnant women are the subjects of grave renal disease, but the constant occurrence in Eclampsia of evidences of renal failure, such as the scanty secretion of highly albuminous urine, commonly containing tube casts, and often blood corpuscles, has been pointed to as evidence of the presence of renal

renal failure in the vast majority of Eclamptics. The presence of albumin it should be mentioned, however, is occasionally noticed only after the first convulsion.

It is equally certain that a proportion of cases of Eclampsia do occur in which no albumin is found in the urine. Charpentier²⁶ has collected a record of 141 such cases, but even that number must bear only a small porportion to the total number of Eclampsias. There is thus abundant evidence that the kidneys are affected in by far the greater number of cases of Eclampsia. It must be confessed, however, that even in cases where the convulsions have been extremely violent the degree of kidney mischief, discernible post-mortem, frequently bears no proportion to the severity of the attack--occasionally kidney lesions are almost nil. That such lesions as exist are very transient in character is shewn by the speedy disappearance of the symptoms after the birth of the child, and by the fact that few eclamptic women present evidence of renal disease in after life. The conditions most frequently found after death have been congestion and sometimes anaemia of the swollen cortex and fatty degeneration of the epithelium of the glomeruli: multiple infarctions,

infarctions, surrounded by areas of necrosed tissue, (the so-called focal necroses), have been, specially of late, regularly observed in these cases; but these latter lesions are commonly found also in the liver and spleen, as well as sometimes in the brain.

Many suggestions have been hazarded by way of accounting for the origin of the renal disease which has been thought to underlie Eclampsia.

²⁷Halbertsma laid stress on the frequent occurrence of dilatation of the ureters, above the true pelvis, a condition which he thought might be caused by pressure of the child's head, and he thought that the consequent damming back of the urine might be a possible cause of the disturbance of the renal function. This state of the ureters has been corroborated by Löhlein.²⁸ This theory does not seem to be a sufficient explanation of the cause of the renal trouble. It cannot possibly account for cases occurring very early in pregnancy, before the child's head can exercise much pressure at all.

If we are to regard the kidney fault as the result of partial and gradual closure of the ureters then we would naturally expect that before the condition advanced far enough to produce such grave kidney changes we should find much greater dilatation of the

the ureters along with dilatation of the pelvis and calyces of the kidney. At any rate one would not expect to find uraemia in such cases as enlarged prostate until the disease had advanced far enough to produce dilatation of these parts as well as enlargement of the ureters.

On the other hand if it be considered that the condition is acute, such as occurs in cases where a stone becomes impacted in each ureter, or in one ureter when the other has been already closed by pre-existing disease, then the symptoms are not at all what one would expect; for in such cases (called Obstructive Suppression), as ²⁹Fagge has pointed out, the symptoms follow a totally different course. Convulsions and coma hardly ever occur and the intellect remains clear to the last.

Many other observers have suggested the possibility of some form of pressure having to do with the production of the kidney lesion, and it must be admitted with good reason. It is difficult otherwise, than on some such grounds, to explain the greater frequency of convulsions in primiparae, in twin-pregnancy, and in hydramnios. A circumstance having some significance from this point of view has been observed by me in every case which has come

come under my notice, namely, that the convulsions have come on in the early morning, at a time when the greatest pressure has been exerted over the longest period in the twenty-four hours, on the parts behind the uterus. This may have been an accident but still it occurred in about a dozen cases.

It has been suggested that direct pressure on the renal veins by the pregnant uterus is responsible for the kidney failure, and it has been experimentally proved that ligature of the renal veins will produce somewhat similar symptoms.³⁰

By others, again, it has been supposed that the changes in the kidney are rather of the nature of a change in the blood supply to the kidney, than a gross lesion, by vaso-motor disturbance of the vessels of that organ, owing to reflex irritation by the uterine nerves.

The weakness of these theories, of course, lies in their inability to explain the cases occurring early in pregnancy, but the mere fact that such early cases do occur does not seem sufficient to discount the possibility of pressure having something to do with the disease; for the number of cases happening early in pregnancy is not large. By far the greater number occur in the latter half of pregnancy and it is

is possible that a number of these early cases are really Eclampsoids.

The nature of the effete material retained and accumulated in the blood as a result of this supposed failure of the renal excretory apparatus has been for many years the cause of much speculation and many experiments have been instituted with a view to the elucidation of the problem.

The excess of urea found in the blood in cases where the kidneys have failed in their excretory function naturally gave rise to the belief that the convulsions have their origin from the accumulation of this substance in the blood. Bostock, Christison and Gregory³¹ were the first to draw attention to the increased amount of urea in the blood in such circumstances, and Priory³² invented the term Uraemia as a suitable name for the disease, and the term has been retained as a convenient one even although the theory which gave it origin has long since been discarded. There are so many weighty objections to the acceptance of the urea theory that it has now few supporters.

It has been shewn that although the amount of Urea in the blood of Eclamptics is much increased it is also in great excess in other conditions in which

which no convulsions occur, such as in Cholera, and that its direct introduction into the blood in large quantity has had no untoward result.

Realising the objections to Urea being the cause of the convulsions, Frerichs³³ sought to evade the difficulty by suggesting that Carbonate of Ammonia is formed in the blood by the decomposition of Urea by aid of a ferment. His hypothesis was amended by³⁴ Treitz who advanced the view that the decomposition takes place not in the blood but in the stomach.

Though the symptom produced by injection of Carbonate of Ammonia into the blood resembles Eclampsia, the likeness is not complete, and the arguments of Frerichs as a whole have not been supported by other observers.

³⁵ Voit first suggested that the convulsions were not due to any one poison but to several, and his theory received much support from other observers. He believed that the symptoms might be produced by "any substance which is not a normal constituent of the blood, if it accumulates in large quantity and is not³⁶ eliminated."

³⁷ Dr Roberts and others attributed the symptoms to the accumulation in the blood of products intermediate between urea and the albuminous substances from which it has its origin. As examples of such intermediate

intermediate products he instances Creatin, Creatinin and other extractives.

It is evident, therefore, that there has been no general agreement as to the nature of the poison responsible for the disease.

The belief that renal disease is the fons et origo of Eclampsia, and that the resulting accumulation of effete products in the blood is responsible for the symptoms has of late years lost ground.

Influenced by many considerations, that have rendered that theory difficult of acceptance as an explanation of the whole disease, amongst which may be instanced the comparatively trivial nature of the renal lesions observed post-mortem; the fact that serious kidney disease seldom ends in Eclampsia; the difficulty of explaining on that hypothesis those cases of Eclampsia occurring early in pregnancy and those which occur without albumin in the urine the most modern writers, particularly those of the French and German Schools, have endeavoured to trace the origin of Eclampsia to a toxaemic source, not necessarily referable to renal changes but brought about by the presence of toxic matter in the blood or tissues in some unknown manner, and arising from an uncertain source. To this theory the term Auto-intoxication has been given. This

This view has enlisted the sympathies and gained the adhesion of a large number of workers at the present day.

Many observers have gone so far as to suggest that even in normal pregnancy a certain degree of toxaemia may exist, and numerous experiments have been carried out with a view to establish, if possible, the truth of this idea. These experiments had their origin from the work of Bouchard,³⁸ who contended that in health the blood and the tissues contain toxic substances partly introduced with the food and partly produced in the body by the digestive processes and by tissue metabolism, being excreted by the bowels, kidneys and skin. He suggested that, if from any cause there were a disturbance of the equilibrium of these processes, resulting in an undue production or defective elimination of these toxins, a condition of toxaemia would result. He regarded the toxicity of the excretions as an index of the toxicity of the blood.

Numerous experiments have been conducted, in the endeavour to prove the truth of this theory in its relation to normal pregnancy; and efforts have been made to establish proof of a toxaemia existing in that condition (normal pregnancy).

pregnancy).

Tarnier³⁹, Chambrelent and Démon⁴⁰, Goria⁴¹, Blanc⁴² and others believed that they had succeeded in proving that the urine in normal pregnancy, as well as in Eclampsia, had a higher degree of toxicity than in health, indicating a condition of toxæmia as an accompaniment of pregnancy as well as of Eclampsia.

The value of these experiments has since been nullified by Stewart⁴³ who showed conclusively that their results had simply been reached by the use of septic instead of aseptic urine. The experiments had consisted in the injection of urine drawn from healthy pregnant women in the one case and from eclamptic women in the other, into the veins of rabbits.

Dolérus and Butte⁴⁴, however, were able to obtain from the serum of eclamptic women a crystalline inorganic substance, which injected under the skin of rabbits, caused death with convulsions, from which they concluded that the blood contained a convulsive poison of the nature of aptomaine.

Subsequent experiments by later observers, however, who used simply serum drawn from the veins of such women have been more or less contradictory.

But although experimental research has not as yet established conclusively the toxic character of the

the blood of eclamptic women such evidence of the kind as we possess appears to justify the belief in its existence.

There is a wide field for research in this direction and all would welcome direct experimental proof of the existence of a toxæmia in Eclampsia, with the nature of the toxin and its origin. Such evidence would give us substantial ground to work from in combatting the disease.

The theory that normal pregnancy is accompanied by a toxæmia has not been proved at all. One would hardly expect that proof of this is likely to be forthcoming.

The probability that a toxæmia exists in Eclampsia, however, though not as yet supported by direct experimental proof is supported by many clinical and pathological facts. The focal necroses observed in the liver and in the spleen in deaths from Eclampsia, occurring as they do in Enteric fever and other conditions which suggest their origin as a toxæmia, has been pointed out by Longridge⁴⁵ as an evidence of their toxic origin also in Eclampsia.

Many theories have been advanced to account for the origin of the toxins.

According to the German School of observers we

we must look to the kidney, by whose perverted function new and hurtful products are thrown into the system. The French school, on the contrary, regard the liver as their probable source.⁴⁶

As before remarked the lesions occurring in the liver as elsewhere consist essentially of minute capillary thrombi with haemorrhagic infarction, surrounded by areas of necrosis. These results have hitherto been regarded as the effect of the convulsions.

⁴⁷Hey-Groves expressed his belief in a recent paper that the toxins have their origin from three sources (a) placenta, (b) foetus, (c) alimentary canal.

Considering these sources as responsible for the origin of the toxins he regards an alleged increase in the coagulability of the blood in Eclampsia an effect of their presence: he suggests that the toxins are responsible for the symptoms of the pre-eclamptic stage, and the coagulable state of the blood as the direct cause of the convulsions, by the production of the minute capillary thromboses in the brain.

⁴⁸Marx has lately revived the view that Urea or one of its congeners is the toxin of the disease.

⁴⁹Nicholson has more recently suggested that a toxæmia of pregnancy may be due to inadequate function of the

the thyroid gland. According to him Large noted twenty-five pregnancies in which the usual (?) hypertrophy of that gland did not occur; in twenty of them there was albuminuria. He appears to argue that, since many of the symptoms of Eclampsia are similar to those which appear in other circumstances in which defective thyroid action is present, the same fault may be responsible for their occurrence in this disease. We should require much more evidence of the failure in the action of the gland and of its value when administered, in relieving these faults in this condition, before accepting this theory; for a large number of theories have been founded on insufficient data. It has been too frequent a custom to generalise from a few cases of the disease.

A bacterial origin of the disease has been suggested by, amongst others, Doléris, Blanc, and Alexander Favre.⁵⁰ Gerdes believed that he had isolated an Eclampsia Bacillus, a contention which Hofmeister denied.⁵⁰

Passing over the older theories, which have been rejected as unsatisfactory, we find practically all authors agreed on this point that Eclampsia is accompanied by and probably induced by a toxæmia. The

The experiments of Doléris and Butte, and, to a less extent, those of Tarnier and his pupils appear to prove fairly conclusively that the blood is in a toxic condition in this disease; while clinical and pathological evidence also support the conclusions deduced from these experiments. As already stated, attempts have been made to prove the existence of a toxæmia of normal pregnancy, in order, apparently, to shew that the toxæmia of Eclampsia is simply a further development of the alleged toxic state of the blood in pregnancy. These efforts have signally failed. It is highly improbable that a physiological process like normal pregnancy should as a matter of course be accompanied by a highly morbid state of the blood, and it is a matter which need cause little surprise that experiments have failed to prove that it does occur.

Though all are agreed as to the existence of a toxæmia in Eclampsia its mode of origin is still a matter of uncertainty.

The older obstetricians, as already mentioned, regarded renal failure as an essential and preliminary part of the disease, while the most modern authors consider it merely as an incidental complication. The former believed that the renal lesion preceded,

preceded, and paved the way for, the subsequent tox-
aemia, whereas those advocating the theory of Auto-
intoxication appear to hold that the renal lesion,
if it exist, may be the result of the toxic state of
the blood, helping, however, to further aggravate
that condition.

The Auto-intoxication theory has been the more readi-
ly accepted from a consideration of the weakness of
the older theory of renal insufficiency, with reten-
tion of Urea, etc., as an explanation of those cases
of Eclampsia which occur early in pregnancy (assu-
ming that the renal lesion is due to pressure), and
of those cases in which no albumin is found in the
urine, as well as of the symptoms of the pre-eclamptic
stage, when albumin is often absent, while the symptoms
may be already well marked.

It takes no cognisance, however, of the well-estab-
-lished fact that Eclampsia happens so frequently in
plural pregnancy and in hydramnios, a connection
which occurs so often that the relation cannot be
mere accident. Nor does it aid us in understanding
why primiparae are so often affected by the disease,
as compared with multiparae. This may be due, how-
ever, to the greater disturbance of the metabolism of
the body likely to occur under the first incidence

incidence of pregnancy than in subsequent pregnancies. It may be, too, that the greater toleration of toxins in the blood displayed by people of mature age than by younger persons, as shewn by the comparative rarity of Uraemia in Bright's disease occurring in elderly people, has some influence in predisposing primiparae to the disease. As far as our present knowledge of the subject has carried us the theory of Auto-intoxication wants the confirmation of experimental proof, and it seems wise that we should for the present keep our minds open, lest we should be led by a blind acceptance of what are as yet purely theoretical suggestions to follow any one line of treatment to the detriment of our patients.

So far none of the theories advanced has gone further than the stage of speculation, and the fate which has befallen most of the older theories should teach us to exercise caution in accepting any one until it has reached a definite scientific basis. The advances made in this direction in recent years give us reason to hope that we are approaching a point where our knowledge of the subject will give us facts to aid us in coping with a disease in the treatment of which our methods at present are more or less empirical.

II. TREATMENT.-

This will be best considered under three heads: (1) Pre-eclamptic, (2) During convulsions and (3) the obstetric treatment.

(1) In the pre-eclamptic stage.-

Since most cases of Eclampsia present symptoms of a premonitory character, for a varying length of time, before an attack is actually precipitated, and, seeing that treatment at this stage has a powerful effect in averting such a catastrophe, it would be a fortunate circumstance if these symptoms would induce patients to seek advice when treatment is likely to be of avail. It too often happens however, that, in general practice at all events, the physician's aid is sought only after a fit has occurred.

The prodromal symptoms are so marked, in many cases for a considerable length of time, that one is surprised how patients fail to apprehend that something is seriously amiss. It must be remembered, however, that the disease attacks primiparae by preference, and that while the whole of the symptoms experienced in this their first pregnancy are new to them, the additional occurrence of these further early

early evidences of impending Eclampsia may easily be regarded by them as a natural part of the pregnant condition. Moreover, it is probable that the disease occurs with greater frequency amongst the poorer classes, since their mode of life renders them more prone to kidney affections, than those in a more fortunate station in life; and such people are not given to seeking advice for their ailments till they are compelled.

Various writers insist on the presence of premonitory symptoms of the disease in practically every case; one well-known writer going so far as to ascribe the non-observance of these symptoms to the defective power of observation of the physician. Whether this be so or not it is certain, that, in general practice, the disease comes under observation, in the majority of cases, only after the first fit has appeared.

The symptoms which play the part of a danger signal, as a warning of the possible occurrence of Eclampsia, are, particularly--headache (especially frontal in character) with disorders of vision; gastric disturbances; oedema of the face and hands and scanty, high-coloured urine containing almost invariably a large amount of albumin.

albumin.

⁵¹Marx, however, has recently pointed out that a symptom of still greater importance, as heralding a speedy onset of Eclampsia, is the diminution in the amount of urea excreted in the urine. He has never, except once, seen constitutional symptoms arise in cases where the excretion of urea was normal; while toxic symptoms were always present when urea was diminished in quantity. In suspicious cases, therefore, it seems advisable that the amount of urea excreted should invariably be ascertained.

In cases, which shew signs of an impending attack, the treatment advised is rest in bed, a milk diet and removal of waste products from the blood as freely as possible by promoting the action of the various excretory channels, especially of the kidneys, the skin and the bowels.

With a diet of milk as little work as possible is thrown on the kidneys in the way of excretion of nitrogenous material.

⁵²Tarnier's milk regimen--one litre and two meals the first day; the second, two litres and one meal; the third day, three litres and half a meal; the fourth day, four litres or as much as can be taken, but no other food and no other drink, and so on--is more

more than most patients will submit to, and probably a more mixed diet, milk with the addition of starchy food, such as cornflour, arrowroot, etc., as recommended by Galabin,⁵³ with strict abstention from meat in every form, will answer the requirements of most cases.

⁵⁴Charpentier advises the continuance of the milk diet for weeks or months if necessary; that the diet should be wholly of this nature, so long as albumin is present in the urine, and for weeks afterwards; returning to it again, if the urine should shew signs of albumin at any later period; an examination for albumin being made, meanwhile, every four or five days. After the albumin has disappeared for a week, he advises the administration of tonics, preferably bark, iron and gentian.

Diuretics, such as acetate of potash, are probably of some service in promoting the action of the kidneys-
-Naegle⁵⁵ recommends mild diuretics, such as lemonade and cream of tartar. Whatever diuretic may be decided upon it is well in every case to give this treatment a trial, for there is not the same objection to the use of diuretics at this stage as there is in the eclamptic stage of the disease.

The bowels should be regulated by the use of

of mineral laxative waters, such as Hunyadi-Janos, or perhaps with equal advantage by Epsom or Glauber's Salts (the last from its action on the liver may be still more useful). My plan has been to give one and a half to two drachms or more in concentrated solution, fasting, on alternate mornings, on the day between each dose a hot bath being given.

Next in importance to the diet, the most valuable remedy we possess in the treatment of the disease, at this stage, is the bath. Its action in promoting an active diaphoresis renders it a valuable adjunct to the other plans of treatment.

Vapour baths are prescribed by Braun, hot air baths and the ordinary hot water bath by others.

In a case of my own recently under treatment, in which the symptoms appeared to clearly foreshadow an attack of Eclampsia, the use of a hot bath every second night, besides producing a copious diaphoresis, had a marked effect on the secretion of the kidneys. Each night, for an hour or two after getting into bed from her bath, my patient passed large quantities of urine, much more than the whole quantity passed during the preceding two days and night. This result appeared to me to be due to the lowering of the arterial and capillary tension, permitting the kidneys to secrete

secrete urine more easily. By this treatment the oedema of the face and hands, which had been most marked, rapidly disappeared while the total amount of urine excreted was much increased. The albumin was considerably diminished, the other symptoms (headache, etc.) ameliorated, and the woman went to her full time, her labour passing off without any untoward result.

The hard full pulse often observed in the pre-eclamptic stage, which was a marked feature of the case just mentioned, shewing a heightened arterial tension, has been held to indicate the use of more active remedies for the relief of this tension. The immediate effect on the kidneys, which so constantly occurred after the profuse sweating from a hot bath, in the case just spoken of, seems to me to warrant the belief that a lowering of the blood pressure may have a decidedly beneficial effect on the function of the kidneys and to indicate the advantage of blood-letting in this stage when the pulse tension is high. This plan is followed by Cazeaux, Depaul, Tarnier and Peter⁵⁶, as it was almost universally in vogue in times past. It is probable that this plan of treatment, by venesection, by relieving the kidneys of their state of hyper-tension, will have far more

more effect in promoting their function than the most powerful diuretics.

In order to relieve this over-tension of the blood-vessels it has been suggested that such drugs as Nitro-glycerine or Nitrite of Sodium might be advantageously used in this stage. I am not aware that they ever have been used for this purpose in these cases, but it ought to be worth while to give them a trial, for I am convinced that reduction of the blood pressure in the capillary vessels is one of the main indications which should guide our treatment in this as in the later stages of the disease. Venesection is the speediest, as it is probably the safest method at our disposal for this purpose; and I believe that, in this disease, as much as or more than in any other, its gradual banishment from practical therapeutics in recent years, has been a distinct loss to our patients.

Failing to relieve the symptoms of this pre-eclamptic stage by the line of treatment outlined above, we are brought now face to face with two alternatives. We must either let the woman take her chance of Eclampsia or we must induce labour in the hope that such a step may save her from such a calamity. In considering so grave a step, however,

however, we must not allow ourselves to lose sight of two important considerations which should prevent us from hastily deciding on subjecting the woman to any additional risk to her life. In the first place, no matter how severe or suggestive of oncoming Eclampsia the symptoms in this stage may have been, there is no certainty that Eclampsia will of necessity follow; and on the other hand in such grave cases as those which active treatment entirely fails to relieve, it is doubtful if the induction of premature labour will suffice to avert the impending calamity. It may even precipitate the very event we are seeking to avoid.

There can be no doubt, however, that the symptoms in the pre-eclamptic stage of this disease may, while not in the least amenable to the most active treatment, and even increasing in spite of it, so clearly foreshadow an almost inevitable outburst of Eclampsia, that we are compelled to resort to Induced Labour, in order to save the woman, so far as our judgment can shew us, from the danger in front of her.

If the case is taken in hand sufficiently early, however, and the right line of treatment is rigorously carried out in its entirety, there should be very

very few cases indeed, in which it is necessary to bring on labour before its time, and recourse to such an interference with the normal course of pregnancy should only be taken when all the remedies at our command have failed.

Martin, Löhlein, C. I. Jennings and Tarnier⁵⁷ authorise the performance of the operation under the following conditions:-

- (1) That the woman must have arrived at the eighth month, in order to give a fair chance to the child.
- (2) That the albuminuria must have reached a high degree, or the patient present some premonitory sign of Eclampsia.
- (3) That the woman must be a primipara, or have had an attack of Eclampsia at some preceding labour.
- (4) That the inefficacy of treatment and especially of venesection have been proved (Tarnier).

This reference to the Induction of Labour, though belonging properly to the obstetrical treatment has been introduced here advisedly, to save confusion when the obstetrical treatment of the eclamptic stage is considered.

(2) During the Stage of Convulsions.-

Although treatment in the pre-eclamptic stage very commonly succeeds in tiding the patient over the dangerous period, and enables her to pass through a perfectly normal labour, it occasionally happens that the case goes from bad to worse; the symptoms of the premonitory stage become aggravated and convulsions ensue.

Curiously enough, paradoxical as it may appear, the very remedies employed for the relief of these early symptoms, in rare instances, actually precipitate an attack of Eclampsia. A case of this kind was lately described by Dr Irvine of Selly-Oak.⁵⁸

Such a result is on all fours with what has been occasionally observed in the chronic Uraemia of Bright. ⁵⁹ Bartels relates a case of this kind in which the production of profuse sweating by a hot bath, followed by hot packing, in a dropsical patient, at once brought about a series of uraemic convulsions. In such unstable conditions of the bodily functions even a slight disturbance of their balance may induce such an attack.

In many cases, however, apparently without any apprehension of anything being wrong, a woman is suddenly plunged into the most violent convulsions.

convulsions. Certainly the general practitioner commonly finds that his patient has reached the true eclamptic stage before his services are called for. He is, usually without warning, confronted with one of the most trying situations to be met with in his obstetrical work. Whether the premonitory symptoms have been marked or not, the actual onset of convulsions is sudden. Struck down in a moment, as if by a lightning stroke, as implied by the derivation of the name of the disease (from the Greek *εκλαμπω* I shine), the patient passes at once into a severe convulsion. The sudden transition from calm to storm is so well portrayed by Parvin,⁶⁰ in his description of the onset of the fit, that I have ventured to introduce here the event in his own words: "The patient, lying in bed, may have been talking to you one moment, the next she is silent, and you see her face in complete repose, her eyes fixed apparently on some distant object: this is the brief calm which precedes the terrible storm. While you are looking, and possibly, if it is your first experience wondering why her speech has so suddenly ceased, the storm begins. . . . Nothing is more striking than the sudden transformation of the face and expression: the convulsions destroy every trace

trace of beauty and intelligence that may have been present a few moments before: the face is disfigured by horrible grimaces, distorted, discoloured and, while calling for pitiful and active sympathy, may be even hideous or repulsive."

The treatment of so sudden and violent an outburst, which if left alone will almost inevitably, sooner or later, cost the patient her life, may well tax a man's resources to the uttermost and it is necessary that he should have a perfectly clear understanding of the objects to be aimed at in his treatment, as well as the best methods to be employed in his efforts to save his patient.

It is a generally recognised fact that after the birth of the child the convulsions tend to abate, unless it be that the fits have been so numerous and so severe before that event that the woman is already moribund before she reaches that stage. It is our duty therefore, by appropriate means to moderate or control, as far as possible, the number and the strength of the convulsions, until it is possible by our assistance, when it is called for, or in favourable cases by the efforts of Nature unaided, to reach the stage when we may expect the convulsions to cease. Lyle⁶¹ has recently tabulated the line of treatment to

to be followed in this stage as follows:-

- (1) The Control of the Convulsions.
- (2) The purifying of the blood, and
- (3) The emptying of the Uterus.

This list does not appear to touch some of the most important points of treatment and the reference to the obstetric part of the treatment has a suggestion of the violent manipulation which some men consider to be an essential part of the programme, and accordingly I have substituted for it one which seems to cover the ground more completely:-

- (1) Control of the Convulsions.
- (2) Lowering of the blood pressure.
- (3) Purifying of the blood.
- (4) Hastening of labour, by artificial means when such interference is urgently called for, and when this can be done without adding to the danger of the patient.

(1) Control of the Convulsions.-

Up to quite recent times Chloroform was almost universally employed to keep the convulsions in check, and to allay irritability of the cerebral and spinal centres, while in many cases it was relied upon as the sole treatment of the disease.

The mode of administration was to deeply anaesthetise the patient for a lengthy period after the first convulsion--for an hour or more. If the convulsions

convulsions did not recur in this time the patient was allowed to recover gradually from the anaesthesia, the chloroform being immediately re-administered on the first indication of returning convulsions--the dilatation of the pupil being taken as the test that the fits were again imminent--this was kept up often for 10-12 hours at a stretch (⁶²Runge).

In many instances the use of this drug alone in Eclampsia has given favourable results. Statistics of series of 20, 12 and of 9 cases thus treated have been reported without a death.⁶³

Charpentier reports 63 cases also treated in this way with a mortality of 11 per cent.⁶⁴

Such favourable results were not however, experienced in the Paris Maternité, where the death rate under this treatment rose to 50%,⁶⁵ and it must be admitted that chloroform used alone has failed to justify the expectations that were formed as to its value in this way.

⁶⁶Charpentier believes that it should not be adopted as an exclusive treatment, nor absolutely rejected, for if it fails in some cases in others it is of great value.

In view of the general acceptance at the present day, of the toxæmic source of Eclampsia, it is obvious

obvious that this drug can only have a limited range of action in the disease, acting merely as a buffer between the poisoned blood and the brain and spinal centres, so that any beneficial effect it has can only be of a temporary character, lasting only so long as the patient is in a state of anaesthesia. It is thus evident, that in cases where the birth of the child is long delayed, its action has to be kept up for so long a period that it is bound to exercise a hurtful influence on the organism. Depaul indeed asserts that many patients have lost their lives by its effect in intensifying the coma and the cyanosis. Less serious results likely to follow its long continued administration are post-partum haemorrhage and oedema of the lungs.

For these and other reasons it has been by many physicians almost, if not absolutely, discarded-- mainly by the French school of Obstetricians.⁶⁷

⁶⁸
Lyle condemns it absolutely; because he considers it very depressing to the patient.

Such a wholesale condemnation of Chloroform is unfortunate in that it is apt to lead us to dispense with one of the most valuable drugs at our disposal for the treatment of certain stages of the ailment in question, and one which we cannot afford to have

have out of our list of remedies in cases where it is necessary to use any means to hasten delivery.

It has its place in the treatment of Eclampsia which no other drug can fill. It enables us to control the convulsions to a certain extent at the outset, until we are able to arrange and carry into effect our plan of treatment: it controls the extreme violence of the convulsions, and thus may avert such calamities as Apoplexy, or death from suffocation during the fit: and it renders any operative interference less likely to aggravate the convulsive condition or to induce fresh convulsive attacks. Its use should, however, be limited to this sphere of action. In this restricted use it cannot have any profoundly depressing effect on the patient. Few would care now-a-days to trust to it as a curative agent.

Dissatisfied with the temporary action of chloroform many have advocated the use of Chloral Hydrate on account of the more lasting effect it produces. It lessens arterial tension and reflex excitability and lowers the temperature (Parvin).

⁶⁹
Charpentier prefers it above all other remedies and claims to have used it with such good effect that he has had a mortality of only $3\frac{1}{2}\%$ in 114 cases by its

its use. He adopts the following method in using it:- 4 grammes (1 drachm) in 100 grammes of quince mucilage are injected into the rectum (Boislinière advises the firm pressure against the anus of cloths wrung out of ice-cold water to aid its retention), and, if the injection is not retained, it is repeated a second and a third time till the rectum is tolerant. In five to six hours whether the convulsions cease or continue the injection is repeated: in one case 12 grammes (3 drachms) and in another 16 grammes (4 drachms) were given in twenty-four hours--he seldom gives more than 4 drachms during the whole day. Intervals between the injections are lengthened as the convulsions abate.

The treatment is not left off at once--he always gives 4 grammes at the end of the first twenty-four hours, reckoning from the first convulsion in order to guard against their recurrence.

⁷⁰ Winckel also strongly recommends this treatment by which he has saved 85 out of 92 cases.

⁷¹ Pinard at the Hospital Lariboisière treated eight cases by chloral alone in 1883 with one death.

To be effectual at all the drug must be administered in large doses, and, of course, by the rectum, since medication by the mouth is impossible in these cases.



cases.

It may be remarked here that Eclampsia appears to confer on its unfortunate victims a strange tolerance of huge doses of the most powerful drugs, doses which would almost certainly produce severe toxic effects if not death itself, if given to a person in health. It will be seen later that Morphia also is given in enormous doses in this disease, as also Veratrum. Small doses of these drugs appear to have no effect whatever here.

With such a record of successes it is strange that Chloral is not more frequently and systematically employed in Eclampsia. One seldom, in reading reports of cases, finds reliance placed on this drug alone in treatment, though one finds often enough that it is employed as an adjunct to other methods of treatment, but usually in paltry, insufficient doses which can at the best have little influence on the convulsions.

There are many drawbacks to its employment which may account to some extent for this. A serious disadvantage is the slowness of its action, from the mode of administration, as compared with that of other drugs used for the same purpose. Then the bulky and clumsy method of dosing the patient, the difficulty in

in getting the enemata retained by a patient in the throes of convulsions, when bowels are often voided involuntarily, or in a state of coma with relaxed sphincters, make its action tardy and uncertain-- serious faults in a disease where timely interference and rapidity of action of the remedies employed are of prime importance.

For this and other reasons the drug has hardly had the chance it deserves.

In recent years there has been a strong reaction in favour of the use of Morphia in Eclampsia, which appears to be amply justified by the results obtained from its employment.

The older statistics of the Morphia treatment, were unfavourable, giving a death rate of 57%, but the striking results published by G. Veit⁷² have done much to popularise the use of the drug in Eclampsia at the present day. In more than 60 cases he had only two deaths--a mortality of 3.3%--a much lower percentage than most of the other plans of treatment can shew. ⁷³ Smith of Melbourne states that no death has occurred in the Melbourne Hospital from Eclampsia since the use of Morphine was begun.

Equally successful treatment by this method has been frequently recorded of late in the Medical papers,

papers, in cases where Morphia appears to have had a direct effect in controlling the convulsions, and in many of these cases it is evident that it does not retard the course of labour.

A series of cases published by Fitzgerald⁷⁴ of Grahamstown is specially striking in so far as one has presented by way of comparison the treatment of two cases of the series by Chloroform and the Induction of premature Labour, both cases proving fatal, while the others treated by Morphia recovered.

As an offset to this record of success, however, we have Jardine's⁷⁵ testimony of the inefficacy of the treatment in his hands, and it may be noted in passing, that in his recently published lecture on the treatment of Eclampsia by Saline Injections, there is an account of one case which to all appearance died of Morphia poisoning after the injection of half a grain of Morphia. In the same article he quotes the statistics of the mortality at the Glasgow Maternity Hospital during the preceding 15 years, amongst cases treated by Chloroform, Chloral, Veratrum viride and Morphia. It reached the high average of 47 per cent.

The dose of Morphia must be large. Veit⁷⁶ gives as a first injection .03 to .04 gramme ($\frac{1}{3}$ grain and a little over). In order to secure a continuance

continuance of the narcotic effect a second injection of at least half as much is given soon. As soon as any muscular movement shews itself, indicating the interruption of the narcosis, another injection is given. In four to seven hours he has given $1\frac{1}{2}$ to 3 grains of Morphia.

⁷⁷
Schauta is content to give $\frac{1}{6}$ grain of Morphia after each convulsion until a deeply narcotic effect is produced.

⁷⁸
Clark of Oswego recommends the injection at once of $1\frac{1}{2}$ grains. In the event of a paroxysm returning at any time after two hours the injection is repeated, and if in labour the woman is given another injection in eight hours whether there are convulsions or not. One would imagine that few men, with a regard for the safety of their patients, would be bold enough to follow in the footsteps of the last writer quoted.

⁷⁹
Lyle sums up the advantages of Morphia in the following terms:-

- (1) It controls the convulsions.
- (2) It prevents excess of waste products being thrown into the blood.
- (3) It does not weaken the patient.
- (4) It does not injure the child.
- (5) It has no effect on the kidneys.
- (6) When the patient is under its influence labour often commences and is greatly hastened.

hastened.

Some of these statements are certainly open to question.

The uniformly successful treatment by Morphia appears to place it in the forefront of our remedies for the control of the convulsions, but some of the heroic methods of employing it, mentioned above, cannot be free from risk. In the cases published by Fitzgerald a smaller dose of the drug seems to have been quite effectual in controlling the fits; and, if the more moderate doses are sufficient, it cannot be wise to increase the woman's danger by employing such unnecessarily large doses as 3 grains of Morphia thrown into the system by hypodermic injection within a period of two hours, as recommended by Clark.

Morphia is the fashionable drug of the present day and the results got from its use have probably gained for it a permanent place in our treatment, but it will certainly be found, sooner or later, if such large doses continue to be rashly administered, that some cases at least have been lost not by the disease itself but by the treatment. It should be remembered that Morphia is not a curative agent in Eclampsia. Its sole action lies in the control of

of the convulsions, by virtue of its sedative effect on the nerve centres, an action similar to that produced by chloroform only more powerful and lasting. It is questionable if it does exert much influence in preventing the further production of toxins in the system, as it has certainly none in destroying or effecting the removal of those already formed. It has practically no effect in relieving arterial pressure, and it is very doubtful if it has, as Lyle asserts, any effect on the course of labour.

The Bromides appear to be useless in this disease.

(2) Lowering of the Blood Pressure.-

Amongst drugs employed in order to relieve the hyper-tension of the arteries, and capillaries, invariably present in this stage of the disease Veratrum viride is the one which has been most extensively used. This has been described as the American method of treatment since its use has been most in vogue in that country.

80
Fearn in 1871 reported 24 cases treated by large doses of Veratrum without a death.

81
Rushmore has collected 85 cases so treated with 20 deaths, a mortality of $23\frac{1}{2}$ per cent.

82
Jewett reported to the American Gyn. Society in 1887 22 cases treated with Veratrum viride with a mortality

mortality of 18 per cent.

This drug has also been given in huge doses.

Fearn of Brooklyn has given it in doses of 15 minims to 1 drachm (?) repeated every 5 or 10 minutes till the pulse becomes soft or vomiting sets in.

⁸²Boyd in one case gave 20 minims of the fluid extract every 15 minutes till 120 drops had been given: in ten minutes after the last dose vomiting occurred with a fall of the pulse-rate from 130 to 54.

Such enormous doses are little likely to be imitated by many of the profession in this country at all events, and in any case such a powerful cardiac depressant must surely be employed with the most extreme caution.

It is a drug which has not gained much ground in this country and is probably little likely to do so.

Amyl Nitrite and Nitro-glycerine have been employed for the same purpose but in so limited a number of cases that no accurate conclusions as to their effect can be deduced.

A further method of relieving the over-tension of the vessels which has for a number of years past most undeservedly fallen into disrepute is Venesection.

In one modern book of Midwifery for the use of students compiled by an Edinburgh teacher it has not

not even a place in the treatment.

Fortunately there is evidence lately of its more frequent adoption, as one of the remedies in Eclampsia; and it is well that such a reaction has occurred, before its final banishment from modern treatment, since the greater success in the treatment of Eclampsia in this country as compared with foreign countries⁸³ has been, probably with reason, attributed to its employment by our obstetricians, to an extent, as⁸⁴ Naegele remarks, that Germans have not had the courage to imitate.

In former years in this disease, as in others, it was used too much as a routine measure and the amounts drawn were certainly excessive; facts which have no doubt greatly prejudiced modern opinion against it. On the other hand one cannot but be struck, in reading reports of cases at the present time, by the half-hearted manner in which this remedy has been employed.

In Jardine's list,⁸⁵ already quoted, we read for instance of a fatal case (Case IX) in which there was marked oedema of the whole body, even the conjunctivae being affected; and the lungs were also in the same condition; the pulse was 104 and very tense--surely an ideal case for the lancet and yet he contented himself with the abstraction of six ounces of blood,

blood, immediately afterwards injecting two pints of saline fluid into the axillary tissues: later on four ounces of blood were drawn, followed again by the injection of a pint of fluid into the cellular tissue, while in an earlier case (Case V.) in which the indications for bleeding were far less evident, we find him expressing a fervent hope that the post-partum haemorrhage would be profuse. His hopes were unexpectedly fulfilled and the patient recovered. One cannot help thinking that if the lead given by Nature in the earlier case had been followed in Case IX. the result might have been different.

The amelioration of the symptoms, which almost always sets in immediately after the birth of the child, is probably due to the haemorrhage following delivery, although it must be admitted this is seldom profuse: and if so, it is certainly a powerful argument in favour of venesection. It may of course be due to the relief of the effects of pressure of the gravid uterus, but pressure on the renal veins is not, I think, admitted as a contributory cause of Eclampsia by the more modern theories of its causation. From the point of view of the most modern theories of the toxæmia of Eclampsia, the beneficial result following delivery must of necessity be due to

to the removal of the source of the toxins (the placenta and the child), unless it be granted that the result is due to haemorrhage, and it is difficult to see how the removal of these supposed causes of the toxæmia could, instantaneously in many cases, produce so profound a change, since the toxins must have been generated and circulating in the blood over a period of some weeks, probably months, duration at least. It is quite justifiable, therefore, I think to assume that the haemorrhage plays at least some part, probably a very important part, in effecting the favourable change so constantly observed just after delivery.

The fact that convulsions occasionally set in first in the puerperium is, to my mind, no valid argument against this assumption, for we know that the discharge of blood, post-partum, in cases of Eclampsia, is, owing to the highly coagulative nature of the blood, said to be characteristic of the disease, often very small in amount.

If we admit then that the haemorrhage after delivery has a decidedly beneficial effect on the disease, there is no valid reason, so far as I can see, why haemorrhage induced before delivery should not have an equally favourable effect. Its choice is

is not empirical nor its use unscientific. Such a charge could be much more reasonably urged against the use of Morphia, which, after all, simply benumbs the cerebrum and paralyses the motor-centres, keeping the convulsions in check until the birth of the child brings about Nature's own cure.

Venesection is the most powerful and rapid means we possess for bringing about a reduction of the arterial and capillary hyper-tension. It does this without direct action on the heart, which renders Veratrum so dangerous a remedy. By this means it acts indirectly on the irritable brain and spinal centres, which are supposed to be in a state of anaemia from contraction of their arterioles (it is believed that this condition of the nerve centres is produced by the action of the toxins in the blood). On the other hand, when the venous sinuses of the brain are gorged with blood as a result of the convulsions, venesection acts directly in relieving this engorgement, thus removing the risk of Apoplexy and lessening the coma. In like manner it lessens the tendency to pulmonary oedema which is so fertile a source of danger after severe convulsions.

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According to Robin pulmonary ventilation is accelerated by venesection. In one case he found that the

the amount of air traversing the lungs was increased 61% by blood-letting.

Its action on the kidneys is still more noteworthy. By virtue of its power in reducing the capillary pressure, and, probably also, by relief of venous stasis, in these organs, it has a decided influence in promoting a restoration of their functions.

⁸⁶
Robin found that after bleeding to the extent of 150 to 250 grammes, in patients suffering from Pneumonia, Uraemia and Heart Disease, that Polyuria was constantly observed and that the standard of solid ingredients--Urea, etc.,-is notably increased.

It also removes a large portion of the toxic material circulating in the blood and allows of the dilution of that remaining, either by the rapid re-regeneration of the blood or by saline injections.

Venesection, therefore, appears to exert a very powerful influence on the various morbid effects observed in an attack of Eclampsia. No other plan of treatment seems to have such a wide range of action on these effects of the disease. The clinical results observed in this treatment are no less convincing, and they have led many of our most eminent obstetricians to place implicit reliance on this method of treatment. There are few objections to

to its employment. Such as have been urged--its temporary effect, the danger of post-partum haemorrhage, from the anaemic or hydraemic condition of the blood, following its use, and the depressing effect on the patient--have little foundation in fact.

⁸⁷
Georges Hayem has shewn that except at the extremes of life even large bleedings are easily borne. The greater liability to post-partum haemorrhage one does not find in practice; and if its effects are temporary they are so decided that in cases where labour is unduly prolonged, the use of simple remedies, Morphia and Chloral, are quite sufficient to prevent the return of the convulsions. While, in these cases in which labour does not set in at all after relief of the convulsions, there can be no objection whatever to renewed blood-letting from time to time. The amount of blood drawn should not be excessive; a moderate amount, 15, 25 or 30 ounces is sufficient. The large amounts recommended by some authors--⁸³3-4 lbs. by Depaul; ⁸⁹3 lbs. by Hamilton, repeated if required,--are neither necessary nor desirable.

It is absolutely essential to bleed early in the disease--the sooner the better after the first convulsion. Such success as I have had in the treatment of these cases has seemed to me to be

be attributable solely to free and timely bleeding. It is useless to employ the remedy only as a last resource when all other means have failed, when oedema of the lungs and cyanosis have developed. Probably at such a stage it will hasten the patient's end. A small pulse is no contra-indication. According to Naegele the pulse improves as the blood flows.

90
Spiegelberg remarks in speaking of venesection:-

"From my own experience, which corresponds with that of the older authors and most authorities, I place blood-letting first in the treatment of Eclampsia."

In my own limited experience venesection has proved so useful that I have not had occasion to discard it in favour of any other remedies in any of the cases I have treated. My cases seemed to me to be as severe as those I have met with in the literature at my command. Before treatment was undertaken these women were in violent convulsions: in most of my cases the coma was profound and usually lasted till after the children were born, while a deep stupor continued for many hours or even longer after that event. In several of my cases there was complete amaurosis for a day or two after the convulsions. In such cases as the urine could be examined--excepting in one case early in pregnancy--it was found to

to be highly albuminous.

I have treated thirteen cases of Eclampsia in my own practice, and by far the larger number--certainly all the severe cases--were bled. I have never had a death from the disease. Other plans of treatment were sometimes, for various reasons, employed in addition, but to venesection alone I attributed the results. Eleven of the cases occurred during the time that I kept accurate notes of my Midwifery cases, and these will be referred to again later on. I invariably found that a severe convulsion followed the venesection, and, as a rule, no more.

Several other methods of treatment have an influence in diminishing the blood-pressure but as they also act by purifying the blood they will be considered under that heading.

(3) The Purification of the Blood.-

This is best effected by Diaphoresis, Catharsis and dilution of the blood by saline transfusion. Our efforts are directed towards removal of the poisonous matters in the blood through the various emunctories. Time is of the utmost importance, since the period in which our remedies are to be of avail is short. Consequently diuretics, which can only act

act slowly are of no use here. Besides, even if there were time, the functions of the kidneys are so completely in abeyance that drugs are unlikely to have the least effect in promoting their action. Diaphoresis is most readily induced by the hot pack, and in some instances by the hot bath, as well as by Pilocarpin (hypodermically). Its place in the treatment comes, naturally, only after the convulsions have been brought under control and it appears to have an important influence in relieving the resulting coma.

The Hot-bath Treatment has been strongly advocated by Bre⁹¹us who treated 24 cases in this way with two deaths (although he combined the use of narcotics with this treatment). The patient is placed in a hot bath at 38° to 40°C., the temperature being gradually raised by the addition of hot water to 40° or 45°C. In this the woman is kept for half an hour and afterwards put to bed and sweating encouraged by wrapping her in hot blankets. He found that he was able by this means to lessen the coma and the oedema of the tissues. The hot bath treatment is not readily available in private practice, where its place is best taken by the hot pack which should never be omitted when there is time to put it into

into effect.

The use of Pilocarpin must be reserved solely for those cases in which there is more or less complete return of consciousness in the intervals between the convulsions. Its powerful sialagogue action renders it a very dangerous remedy when the patient is in a state of coma, for besides the danger of asphyxia from the accumulation of saliva in the throat, there is also a risk of increasing the tendency to oedema of the lung, if not of actually causing it.

Fordyce-Barker used it in six cases with nearly fatal results.

It is nonsense, however, to dismiss Pilocarpin from our list of remedies with the contempt of it shewn by some authors. Hirst, for instance, says that it need only be mentioned to be condemned, because in the Edinburgh Maternity where this drug was employed for a time it gave the high mortality of 66.6%.

Used in the circumstances indicated above it has a decidedly beneficial effect.

In one of my cases, in which after early venesection labour advanced so slowly that by and bye there were signs of a return of the convulsions, I satisfied myself that repeated injections of Pilocarpin had a distinct effect in staving off the attacks. Of

Of course, in that case which was a mild one, there was complete recovery of consciousness sometime after the convulsions were checked.

Catharsis is to be brought about by the most active and easily swallowed drugs, such as one or two drops of Croton oil on the back of the tongue, whether the patient can swallow or not, or $\frac{1}{4}$ grain of Elaterium rubbed up with butter. In deep coma a large enema may be used. Hirst recommends the use of a concentrated solution of Sulphate of Magnesia when the patient can swallow, in dessert-spoonful doses every quarter hour till free catharsis is obtained. In such cases he has given as much as 16 ounces of the concentrated solution by repeated doses till the bowels have begun to act. He believes it has a distinctly beneficial effect on the stupor following the convulsions.

The use of Saline Injections by transfusion either into a vein or into the subcutaneous cellular tissue has been much lauded of late.

⁹²
Jardine of Glasgow has recently published a list of 17 cases treated in this manner in all of which however he combined with the saline injections other methods of treatment. One is not impressed with the value of the treatment in his hands. Out of the first twelve cases four died, while, in the succeeding five,

five, two died--a total mortality of 35%.

Doubtless the cases were bad, and the disease well advanced before the treatment was begun, as the cases were all treated in hospital.

In his remarks on the treatment, however, he claims results which are at least open to question. The solution he used in the first 12 cases was, first of all one part of bi-carbonate of potash to three parts of common salt, one drachm in the pint; and, later, equal parts of each, one drachm to the pint. He asserts that these injections have a powerful diuretic action and that they favour the excretion of Urea and Uric acid by the kidneys; and in proof of his contention he points to the fact that the amount of urine is much increased after delivery has been effected; while the amount of Urea excreted is also in excess of what it had previously been: these results he attributes to the diuretic action of the bi-carbonate of potash in the injections.

With regard to the former result, the increase in the amount of urine, it is perfectly well known that the secretion of urine is immediately and notably increased in practically all cases of Eclampsia, after the birth of the child whether transfusion has been practised or not, and it does not appear to be con-

conclusively shewn that the increase is distinctly greater after transfusion than without it.

Moreover, we have the right to dissent from the contention that such comparatively small doses of Bi-carbonate of Potash as fifteen grains in the one case or half a drachm in the other--where a pint of fluid is injected or proportionately large doses if more fluid is run in--even when employed in this fashion can have such markedly diuretic effects as are claimed for them: when one finds infinitely more massive doses and much more powerful diuretics quite inoperative in the pre-eclamptic stage.

In connection with the further effect claimed for these injections--the increase in the excretion of Urea and other solid ingredients by the kidneys--it is worth while referring to the experiments of ⁹³ Fleischer on the excretion of Urea in Bright's Disease. He instituted careful analyses of the urine passed by persons affected with Bright's disease, comparing them in each instance with analyses of the urine of healthy persons, placed under exactly similar conditions as regards diet. He found, as a rule, that the amount of Urea excreted by those who had Bright's disease, was much diminished; but, when uraemia set in the amount of Urea became increased far beyond the

the normal, either on the day of the seizure or a day or two later. It is quite probable, considering the similarity of the two diseases, that the same thing may occur in Eclampsia; at all events a recognition of this fact observed by Fleischer makes one chary of accepting Jardine's statement that the increase of Urea, etc., observed by him was due to the saline injections, without definite proof that the same thing does not occur where no injections have been given.

Although Jardine has laid claim to results from his treatment by Saline Transfusion, which one cannot accept as definitely proved, and although his arguments in support of certain bye-effects which he supposes are due to this treatment are not fully convincing, there can be little doubt but that this method combined with Venesection appears to be a step in the right direction.

Alone, it probably still further increases the pressure in the vessels, exactly the effect we desire to avoid; but when a portion of the poisonous material has already been withdrawn from the system by free bleeding it is more than probable that the dilution of the blood left behind, along with the washing of the tissues by the fluid introduced into the body, if

if means are at the same time taken to promote free action of the skin, must have a very beneficial effect in favouring the removal of a quantity of the toxic material from the body.

A method of treatment which does not readily fall under any of the headings, under which the foregoing remedies have been considered, is one which has been recently suggested by Nicholson⁹⁴ who advises the use of this remedial agent in both the pre-eclamptic and the eclamptic stages of the disease. It consists in the administration of Thyroidin or Thyroid Extract and, in the paper referred to, he suggests reasons why the drug may be expected to exert an influence on the course of the disease.

In his paper on Eclampsia and the Thyroid Gland he discusses the similarity of the symptoms in the pre-eclamptic stage to those due to defective action of the Thyroid Gland (Myxoedema, etc.) and the possibility of a defective action of the Thyroid culminating in Eclampsia. He suggests, therefore, in the early stage of the disease, Thyroid Extract in 5 grain doses night and morning, and after a few days the same dose thrice daily. When convulsions seem imminent or have occurred he advises hypodermic injections of ℥x. to ℥xv. of Liquor Thyroidii repeated every hour.

hour. In this connection he points out that Potassium Iodide has been regarded as a specific for Puerperal Albuminuria and thinks this result may be due to the encouragement or re-establishment of Thyroid function by Iodine which may be elaborated by the gland into its active principle, Iodo-thyrin. For this reason he advises the administration of solutions of Iodide of Potassium instead of the ordinary saline injections.

So far, I believe, this method has not been put to the test of an extended trial.

(3) The Obstetric Management of Eclampsia.-

It very seldom indeed happens, at whatever stage of pregnancy Eclampsia may occur, that labour is not induced by the disease. In fact, as the disease is probably more frequent in pregnancy than at any other period, and, since we usually find our patients in labour immediately or soon after the first convulsion, the appearance of labour is seldom long delayed. As just remarked labour may set in at once, either from rupture of the membranes by the violence of the convulsions, or by extension of the muscular spasm during the convulsions to the muscular fibres of the uterus itself. On the other hand its

its onset may be less sudden, being in some cases, probably, delayed until the irritation of the dead child causes its expulsion from the uterus.

In a large proportion of cases, then, we find that labour has advanced considerably by the time we are able to venture on a vaginal examination. It has been found that labour in these cases often advances with great rapidity, owing partly, doubtless, to the lessening of the muscular rigidity of the Os by the general use of Chloral, Chloroform and depressants. Practically all observers have agreed that the termination of labour is the goal to which our hopes should be directed, but there are wide differences of opinion as to the means which are justifiable in bringing about this much desired termination of the case. Some authorities go so far as to insist on the speedy termination of labour in all cases by artificial means, by the simpler methods of delivery by instrumental means or by version when available, or by the forcible dilation of the Os by Dührssen's plan of multiple incision when there is undue rigidity of the Os. Such drastic methods are much to be deprecated if avoidable at all, and are little likely to meet with the approval of any large number of obstetricians at the present day.

day.

Routine treatment on these lines is not likely to give the best chance of recovery to our patients whom apart from the danger of exciting in them a renewal of the convulsions by too vigorous mechanical interference, it certainly exposes to a greater liability to the more immediate after-effects of general Septicaemia or the remoter results of localised Cellulitis or Peritonitis. Such treatment is at the present time, however, very generally resorted to. A reference to different series of cases, published to illustrate the value of certain methods of treatment, will shew that this is the case; the authors of some of these lists having apparently so little confidence in their methods of treatment that they are in the habit of forcibly terminating labour by violent means in almost every case.

In a very large proportion of cases of Eclampsia, if our treatment is of any avail at all and if we have any confidence in the methods we adopt, there should be little interference necessary beyond the delivery by forceps at the full termination of the first stage of labour in some cases, and in many others even a later period, simply to save the woman from the danger of too much risk of irritation during the dilation of

of the vulva. There should be comparatively few cases where more active interference is necessary, and only when it is considered absolutely essential to the woman's well-being should it be resorted to. When the convulsions have once effectually been controlled by venesection, and their return prevented when necessary in prolonged labour by Morphia or Chloral, one can usually wait with patience for the time when Nature herself will complete the event, or until one can interfere with the minimum of risk to the mother.

When labour does not set in at all, a remote contingency, and the convulsions have been brought completely under control by appropriate remedies, then it is wise to leave well alone; and, in the event of the child being alive, to give the woman the chance of carrying her child to the full time, exercising a watchfulness over the case during the further progress of pregnancy, to guard against a repetition of the convulsions, using means to this end which have been described under preventive treatment.

Even when the child is dead it is well not to interfere, since labour will sooner or later come on naturally.

When labour does not set in and the convulsions

convulsions continue or increase in vehemence, we have then to decide the question whether labour should be artificially induced, or if the woman has to take her chance of life either from a possible termination of the fits or from the tardy onset of labour.

Opinion is divided on this point as on many others.

⁹⁵
Pajot, for instance, has considered it unreasonable and more dangerous than Eclampsia itself. Still most authors are agreed that cases do occur where it is justifiable to induce labour; cases which have resisted all treatment directed to the cure of the convulsions, and where the disease is seriously menacing the woman's life: in fact when we have to decide between the apparent certainty of death from Eclampsia, and the possibility of the Induction of Labour removing that risk; when we can satisfy ourselves that there is no alternative, no half-way course we can follow, then we are justified in deciding on the operation.

We must be prepared, however, for an occasional failure, since the convulsions may not cease even with the termination of labour. For this reason we must not wait too long before taking this step, but proceed to the operation at once when we see it is

is inevitable.

One such case has occurred in my own practice. In that case labour was induced at the end of the fifth month, and the result apparently justified the interference. The patient was pregnant with her third child, the former pregnancies having been normal: the convulsions had continued for several weeks, while, during the week before labour was induced, she was scarcely ever conscious. Bromide, Chloral, Pilocarpin and Venesection were tried without avail; (I should employ Morphia in such a case now; at that time I was unaware of the good results obtained from the Morphia treatment); and eventually after consultation it was decided to bring on labour. A bougie was introduced into the uterus, under chloroform, at 10 p.m.; labour began in six hours: strange to say the convulsions ceased after the bougie was introduced. Next morning the placenta was found lying over the Os, and that was expelled first, and then an arm presented. The patient was again put under Chloroform and the child turned by podalic version and delivered. The woman made a good recovery, the fits having finally ceased from the time of the introduction of the bougie.

As a rule the mere induction of labour without

without any undue acceleration of the course of labour is all that is necessary.

Lastly we have to consider a class of cases in which with violent convulsions rapidly succeeding each other, in which in spite of every means employed, or owing to the difficulty in using means to procure dilatation, the Os remains rigidly contracted, with no sign of any dilatation at all, cases in which we are apparently prevented from giving any relief to the woman in time to be of any avail in saving her life. In such cases it has been advised to perform Caesarean section. The indication for such an operation under these circumstances can rarely arise and it is unlikely to be seriously considered. The operation in these cases has not given favourable results.

For the Coma persisting after the birth of the child, which it usually does in the more severe cases, the best treatment is probably diaphoresis by hot packs, aided in some cases by saline transfusion.

For the relief of those cases which occur in the puerperium, the treatment should be on the same lines as that advised for cases in pregnancy or labour, remembering that, since the post-partum haemorrhage is usually very limited, there is still need for blood-

blood-letting as much as in cases occurring before the child's birth. The hot pack and saline injection are also of much use here.

A Suggested Line of Treatment in a Typical Case.-

As it is obviously impossible and entirely unnecessary to put into practice all the methods of treatment hitherto described, in any individual case of Eclampsia, it has been thought advisable to indicate here, shortly, the various steps which should be taken in the treatment of a typical case and the order in which they should be carried out. Because, while there is always difficulty in deciding on the spur of the moment on a course of treatment, this is more especially true when so many plans are presented to us, giving rates of mortality differing little one from another. Moreover, in discussing the main plans of treatment which have been suggested from time to time, I have failed to take note of many accessories to our course of treatment, which though not affecting, to any extent, the woman's chances of recovery are of much importance as regards her comfort.

In the remarks which follow I have drawn upon

upon some suggestions put forward by Hirst in his book on Midwifery, though they are considerably modified.

The woman is kept lying in bed--it is necessary to insist upon this point in the intervals between the attacks as well, because the convulsions come on so unexpectedly that she might cause herself serious bodily injury if she were allowed to get into an upright position--she should be on her back, her clothes so arranged that there is no risk of strangulation by tightening of the neck of the bed-gown. A folded napkin--not a spoon or a cork--must be placed across the mouth between the teeth to prevent protrusion of the tongue. It is not necessary to hold the woman forcibly in bed; her movements in the convulsions seldom disturb the position of the body as a whole; while efforts to control her movements probably make them worse. Chloroform should be administered at once, and continued till the convulsions shew signs of passing off. As soon as the fit has passed over, open a vein in the arm and draw at least a pint of blood. Place on the back of the tongue \mathcal{M} ii of Croton oil diluted with a little sweet oil. One may now inject $\frac{1}{6}$ to $\frac{1}{4}$ grain of Morphia subcutaneously or inject a drachm of Chloral into the rectum. Wring

Wring out three or four sheets or blankets from boiling water and envelope the woman's naked body in them from head to foot, wrapping one round each limb separately and piling hot dry blankets round and over her. As soon as diaphoresis is fairly established we may inject a pint or more of normal saline solution into the tissues, or into a vein if preferred. It can readily be run under the loose skin below the axilla or under the breast. If in spite of this treatment the fits continue Morphia or Chloral may be re-administered. If the stupor continues, while the convulsions cease, and the woman can be made to swallow, a concentrated solution of Sulphate of Magnesia in dessert or table-spoonful doses may be given every half hour or hour, till catharsis is established. When complete consciousness is restored before the birth of the child, Pilocarpin is now a valuable aid to our treatment. As labour advances we may if it be thought advisable, expedite delivery after full dilatation of the Os by forceps or version.

My own cases of Eclampsia have numbered thirteen in all, but as I have a complete record of only eleven of these cases I shall refer below to these alone.

They are spread over a period of eight years, and occurred in a total number of 920 confinements. Seven of the cases were in primiparae and in all except three the convulsions set in before labour; in two they apparently came on in the course of labour while in a third they immediately followed the birth of the child.

In two cases labour was artificially induced; first of all, in the first cases I ever treated, in a woman seven months pregnant, the induction of labour was I believe an error of judgment as the convulsions ceased before labour set in--in this case the woman recovered but the child was dead--and secondly in a case at the end of the fifth month in which no treatment had any effect on the convulsions.

In three of the cases the women were quite blind for one or two days after the convulsions. In all of the cases in which an examination of the urine could be made, except in one, there was a high degree of albuminuria.

In all of my cases the treatment was practically

practically the same, except in one case occurring in the puerperium and in two cases in multiparae in which the Os was found well dilated so that there was no difficulty in effecting a speedy delivery under chloroform.

It consisted in controlling the convulsions at once by chloroform, abstraction of blood by venesection as soon as circumstances would permit, and the use of chloral. In every instance in which blood was drawn the convulsions ceased soon afterwards, and it was thought advisable to allow labour to take its course, even in primiparae in which the process was naturally somewhat tedious, aiding its termination by forceps only when the second stage was unduly prolonged.

This plan was followed even in the severe cases. In one, a delicately formed primipara was delivered naturally in a state of profound coma about twelve hours after the last convulsion--the mother in this case was blind for three days afterwards. All of these women made good recoveries, and two subsequent cases which I have treated in much the same way, since I ceased to keep accurate records of my confinements, have also recovered. No death from Eclampsia has ever occurred in my hands. Venesection

Venesection was the plan relied upon and carried out in almost every case. I always bled at once and freely and to this method any success which has been my lot in the treatment of these cases should, to my mind, be ascribed to its beneficial effects.

I hereby declare that the foregoing thesis on
 Neuronal Eclampsia has been composed entirely by
 myself without any assistance whatever from any
 person - Where recourse has been had to books
 or magazine numbers have been in every instance
 placed for reference -

Edward B. Hector

Castle Douglas -

18th April 1902

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