

A THESIS ON
THE TREATMENT OF
ECLAMPSIA

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submitted by

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Although medical science has made rapid progress in recent times, there remain many dread and urgent conditions, the etiology of which is still obscure and of which the treatment must for the present remain the groping symptom-therapy of the unenlightened clinician.

But, nonetheless, there is a certain fascination in the treatment of symptoms which is lost to those diseases where the etiology has become an established fact, and the treatment a natural sequence.

It is my intention to journey into the realms of symptom-therapy, and to relate my experience on the way.

The word "Eclampsia" is derived from the Greek, "ἐκλάμπω" "I explode", and was frequently used by Hippocrates and Galen in their writings to describe the sudden onset of a convulsive fever occurring during pregnancy. Amongst the earlier authors little attention seems to have been paid to the milder forms of Toxaemia of pregnancy for they seldom mention them, but Moriceau, who wrote a "Traite des Maladies des Femmes Grosses" in 1690 has some interesting observations on intractable vomiting due to the cessation of menstruation, which caused corrupt humours to cleave to the sides of the stomach. He recommends purges to dissolve the humours and regards hiccough as a very evil sign. In 1780, Denman gave a good account of convulsions which he treated by hot baths, fomentations, opiates in small quantities often repeated, and also employed bleeding, sometimes up to forty or even sixty ounces.

In writing on the differential diagnosis of eclampsia Professor Johnstone makes the following statement:-

"Acute phosphorous or strychnine poisoning must be borne in mind, but can usually be ruled out owing to their rarity."

In April 1927 I encountered a very unusual case, and mentioned on account of its rarity. Nurse Rose sent me an urgent message to attend a woman whom she had delivered of a healthy child and who had a fit within an hour of the birth of the placenta. On my arrival at the patient's home I found her dead. During pregnancy she had been under careful medical supervision, and a small amount of albumen was found in the urine; but no other signs of the pre-eclampsia state were found. I naturally concluded that eclampsia was the cause of death.

A few weeks after this event Dr. Kemp was summoned to the same village to attend a woman who died under similar circumstances and who was delivered by the same nurse. Dr. Kemp and I discussed the cases, and I ventured to suggest that possibly the cause of death in the two cases might be strychnine poisoning and not eclampsia. It appeared that the nurse had given both women a draught of Ergot (?), but on post-mortem examination strychnine poisoning proved to be the cause of death, and it was found that the nurse had been supplied with Tincture Nucis Vomicae by a Chemist in mistake for Liquid Extract of Ergot.

For very many years there existed an unfortunate confusion between true eclampsia and epilepsy complicating pregnancy. The two conditions were regarded as synonymous, so that many of the miraculous recoveries reported "without total abolition of the fits" must, perforce, be disregarded. In 1713, however, Amberg describes a case which seems reasonable enough:- "A young lady of twenty-six who had gone about one half her time with child, and had not yet been bled, was invaded with convulsions of the hands, feet, head, mouth and cheeks, which terrified her greatly, and rendered her apprehensive of their being succeeded by an apoplexy. Prescribed:- Phlebotomy in the arm immediately unto eight ounces. A teaspoonful every morning of a nervous powder, to be repeated in the afternoon at four o'clock and at bed time. (A purgative and diaphoretic mixture). After continuing these medicines for two days she perceived no more of her convulsions, and she was happily delivered of a healthy child."

Hamilton, a former Professor of Midwifery at Edinburgh University, who was one of the first British authors to use the word "eclampsia", does not seem to be so sanguine of the treatment of this condition, for in 1781 he states that "the appearance of epileptic fits in pregnant women is frightful; the symptoms are alarming, and the event, always precarious, is most often fatal."

On reading through the medical literature of comparatively later times, one finds oneself able to differentiate several regimes for the treatment of eclampsia, each with its firm adherents, who would brook no interference with

the rules they had propounded. At the time when blood-letting was fashionable, it was naturally applied to every case of eclampsia. It is the oldest form of treatment, dangerous to a degree when applied as a wholesale remedy, but, in selected cases, undoubtedly beneficial.

Following the discovery and routine use of chloroform as an anaesthetic in complicated obstetrics came the application of this drug to the control of convulsions occurring in pregnant women. This method, combined with manual dilatation of the cervix, and very early application of forceps, is, unfortunately, too often the practice with some medical men even of to-day.

It is only within the last half century that surgery has made its most important strides, and recovery after operative interference has become the rule rather than the exception. Place alongside this fact the firm belief of a certain school that the surest way to eradicate eclampsia is to eradicate the pregnancy, and the surgeon cannot be blamed for accepting so direct an invitation to commence a third routine technique - "The Surgical Treatment of Eclampsia". This is the period of rapid vaginal and abdominal Caesarian section, instrumental dilatation, and, in fact, accouchement force in all its horrible branches. The surgeon is a difficult man to oust when once he had carried his knife into a foreign field, so that large numbers of cases are also on record treated by decapsulation of the kidneys, and even by the raising of large osteo-plastic flaps from the skull. Comment on such procedure

is unnecessary. It would be incorrect to say that there is no surgical side to the treatment of eclampsia, but modern technique and statistics have certainly shown that, with the exception of an occasional abdominal Caesarian section, such interference is based upon a wrong primary conception of the disease, and its results are to be deplored.

When the treatment of a disease remains empirical, it is not uncommon for methods to suffer, from time to time, a complete change in almost every detail, made, perhaps, the more complete by the investigator's zeal to discard the well-beaten tracks, and to develop along entirely original avenues. It is in this way that I account for the origin of the Rotunda routine treatment, which accepts intestinal toxæmia as the provisional fons et origo of the pregnant intoxications, and hence treats them by intensive eliminatory methods. Briefly the treatment embraces, gastric lavage to empty the stomach and introduce a purgative, colonic lavage to empty the lower bowel and promote evacuation of the whole intestine; saline purgation, loin poultices to promote renal activity and submammary infusions to introduce fluid. Morphia and other sedatives are only used when the treatment fails, of itself, to control convulsions, and venesection is resorted to merely as an emergency procedure. The introduction of the Rotunda method was responsible for a markedly reduced mortality rate. It was a timely antidote to the radical measures in vogue, more especially on the Continent, at the moment of its inception. Compared with another modern regime it is, however,

open to criticism on two scores. In the first place it is too stringent; to quote from the report of a collective investigation on eclampsia:- "It is impossible to avoid the conviction that the majority of the fatal cases were over-treated, and that in a considerable number the excessive treatment must have been a contributory factor in bringing about the fatal result." These remarks apply much less to the Rotunda method than to others, but I am convinced that the ideal method must be that which is least exhausting to a comatose patient, threatened with rapidly recurring and dangerous convulsions. Secondly the Rotunda treatment is a difficult one to carry out if strict detail be observed, and, although this is not a serious consideration it assumes great importance if there is an alternative method, simpler in its operation, and yet yielding statistically better results.

Narcotics, usually in heroic doses, had been used for many years in the treatment of eclampsia before Stroganoff of Petrograd employed them to devise a carefully regulated routine, both as regards dosage and time of administration. This investigator employs morphia and chloral hydrate, and attaches great importance to segregation in a quiet darkened room, with avoidance of all forms of irritation. He advocates venesection in selected cases, and is strongly opposed to any non-essential interference with the pregnancy.

To-day, statistics show that the incidence of eclampsia is decreasing, and if there be a routine treatment at the present time it is certainly the prophylactic treatment of eclampsia. Of the 2,800 cases which passed through the ante-

natal department of the Swansea Municipal Clinics, during three years only two developed eclampsia, and in one instance instructions were disregarded by the patient.

In 1925, only six cases of eclampsia were treated in St. Thomas's Hospital, London, a very marked decrease compared with previous years.

In the Bristol Royal Infirmary, 1,400 were attended ante-natally in 1926. Sixty had albuminuria, three developed eclampsia, and two of these died.

In the meantime, however, until ante-natal care is enormously extended, and one might even say in spite of it where fulminating cases are concerned, there will remain eclamptics to be treated by one method or another. Reports received from the larger hospitals of Great Britain and Ireland indicate that only two main systems of treatment are now being employed in the three countries - the Dublin or Rotunda method and that devised by Stroganoff.

In certain instances the methods are combined, i.e., a patient is first treated by eliminatory measures, and, if these do not control convulsions, the exhibition of sedative drugs according to a specified time table is commenced. In other instances the Rotunda or Stroganoff method is modified by the introduction of certain small alterations or additions, as a result of which improved statistics are claimed.

At Queen Charlotte's Hospital, the Rotunda method is modified as follows. No stomach lavage is done, and "Veratrone" is given if the blood pressure is high as follows:-

Above 190 mm.	-	1 c.c. hypodermic injection.
175 mm. to 190 mm.	-	$\frac{3}{4}$ c.c.
160 mm. to 175 mm.	-	$\frac{1}{2}$ c.c.
140 mm. to 160 mm.	-	$\frac{1}{4}$ c.c.
Below 140 mm.	-	No veratrone.

Dr. Statham of Bristol Royal Infirmary claims as a useful adjunct to the Rotunda method, the intravenous exhibition of glucose and insulin.

St. Mary's Hospital, Manchester, adopts the Dublin method, but without subcutaneous salines or hot packs. Morphia, up to two grains, is given in the twenty four hours, and veratrone is employed in some cases.

Dr. G.F. Darwall Smith of St. George's Hospital adopts a modified Rotunda method, followed, if necessary, by a modified Stroganoff method. Gastric lavage, he states, is unnecessary and dangerous. Veratrone (.75 to 1 c.c.) is used if the blood pressure is above 180 mm. of mercury. His modification of the Stroganoff technique is very interesting:-

On admission	-	Heroin gr. one sixth.
After one hour	-	Chloral gr. 30.
" 3 hours	-	Heroin gr. one twelfth.
" 7 "	-	Chloral gr. 30.
" 13 "	-	" gr. 22.
" 20 "	-	" gr. 22.

In severe cases he believes in induction of labour by bougies, with rupture of the membranes, and evacuation of as much liquor amii as possible.

Having thus briefly summarised the treatment of eclampsia, I now propose to give some account of my own short experience of the disease before I began to hold any critical views upon its treatment.

During my student days in Edinburgh I became thoroughly conversant with the details of the Dublin technique, and the method as a whole seemed to leave little to be desired. On going into practice I met a number of cases of eclampsia early in my career and each of necessity had to be treated in her own poor home. There was no opportunity of putting the elaborate Dublin method to the test, and so, following the advice of a colleague, I had, perforce to adopt the time honoured method of prolonged chloroform administration, with early application of forceps. My seventy-five per cent mortality was disappointing, but my interest in eclampsia grew and I began to pay frequent visits to the obstetrical departments of the Swansea General Hospital, where the Gynaecologist, the late Mr. Reed, informed me that the Surgical treatment of eclampsia had often been a disaster in his hands, although I saw him performing a Caesarian section upon a case of well marked eclampsia, and the case recovered. When seen one month after this drastic treatment, both mother and child appeared very well.

In Austria and Germany, the Stroganoff method is the one which finds most support, and, according to statistics, gives the best results.

On my appointment as honorary Anaesthetist to the Gynaecological Department of the Swansea General Hospital in 1924, through the kindness of the Honorary Gynaecologist, Mr. Lloyd Davies, I was allowed to supervise the treatment of all cases of eclampsia, which were then treated by a slightly modified Rotunda technique. In 1925 I formulated more or less a scheme for treating eclampsia, not a hard and fast routine but what I believed to be a sound elementary system of dealing with individual cases on the features they presented.

The Swansea General Hospital supplies a very wide area, including many remote country districts, where ante-natal work is still unheard of, and where medical attention is seldom obtained except in emergencies. It is mainly from these areas that my somewhat astonishing total of twenty cases of true eclampsia were admitted. Nineteen of these cases were dealt with on the broad lines of treatment I shall presently describe with a successful result in each case. As the twentieth patient received no treatment after admission I have, and I believe quite fairly, excluded her from my group of cases. She was admitted moribund, and died on admission to the ward.

Of the nineteen treated cases, ten were ante-partum, six intra-partum, and two post-partum eclamptics. The remaining case, my only instance of recurrent eclampsia, developed an ante-partum attack, followed two months later by

intra-partum eclampsia.

As regards neo-natal mortality, my results are not nearly so encouraging as those most recently published by Stroganoff. Disregarding the post-partum eclamptice, nine living infants, including twins in one case, were born to seventeen mothers. Three babies died soon after delivery, leaving me with a recovery rate of thirty-five per cent., which compared with Stroganoff's ninety per cent., would lead one to suppose that the type of eclampsia met with in Russia must be of a milder form than that experienced here.

A description in detail of a case of eclampsia treated by the method I have adopted can now conveniently be given, and will serve to simplify a subsequent general discussion upon the special features of the technique:-

Mrs. C, Primipara, aged forty-two, admitted at 11 p.m. on 24th October, 1926, with a history of severe headaches, visual disturbances and vomiting, followed by convulsions, six of which were known to have occurred. Labour at full term, had commenced at 4 p.m. on the same day. No outside treatment.

The patient a tall stout woman, was comatose, and could not be roused, there was slight oedema of the eyelids, vulva, and lower limbs. Pulse 100, temperature 100.6 F; respirations 24, blood pressure 180 mm. Hg. Regular pains were occurring. She was admitted to a quiet side ward, the lights being muffled, and the floor covered with rugs. The patient's eyes were lightly covered with a moist bandage.

At 11.5 p.m. $\frac{1}{4}$ grain morphin sulphate given hypodermically, together with one hundredth of a grain of atropine sulphate

At 11.35 p.m. - A very severe convulsion occurred.

At 12.15 a.m. - Under gas and oxygen anaesthesia (25th Oct.) one c.c. of a ten per cent sterile solution of sodium luminal administered intra-muscularly. The site chosen was the outer side of the thigh, mid-way between the knee joint and the anterior superior iliac spine,

the needle being inserted as far as the bone, and then slightly withdrawn. This was immediately followed by a section of the median basilic vein of the left arm, whilst readings were made from time to time from a sphygmomanometer loosely applied to the right arm. Blood was collected by canula in a graduated vessel, until the sphygmomanometer registered a pressure of 140 m.m. Hg; by this time 15 ounces of blood had been removed. A special record syringe was now attached to the canula, and 30 c.c. of a ten per cent sterile solution of magnesium sulphate injected. A vaginal examination was made, and a normal vertex presentation diagnosed. Four ounces of urine, which later boiled solid with albumin, were withdrawn by catheter. The period of general anaesthesia was approximately twenty minutes.

At 2.15 a.m. - $\frac{1}{4}$ grain morphin sulphate subcutaneously.

At 6.15 a.m. - 1 c.c. of a ten per cent solution of sodium luminal given intramuscularly, and, by separate hypodermic injection one ampoule (.4 gm.) of euphyllin.

At 6.30 a.m. - Gas and oxygen anaesthesia, whilst a soap and water enema ($1\frac{1}{2}$ pints) was administered. A good constipated result occurred soon afterwards.

At 8.20 a.m. - Patient voided six to ten ounces of urine in the bed.

At 10.15 a.m. - $\frac{1}{4}$ grain of morphin sulphate administered. Patient was now conscious, and semi-rational. She complained of her pains. Labour was progressing naturally, and the membranes bulging. From now onwards she was persuaded to drink large quantities of barley water, and given three ounces of mist. sennae. co.

At 4.15 p.m. - 1 c.c. of sodium luminal given intramuscularly. Blood pressure 140 mm. Hg.

At 8.15 p.m. - 1 c.c. of sodium luminal given intramuscularly. Eight ounces of urine withdrawn by catheter.

At 9.30 p.m. - The head had now been on the perineum for some hours, the membranes having ruptured. Under light gas and oxygen anaesthesia forceps were applied, and the head gently drawn over the perineum. A living male child was thus delivered, weighing six pounds.

No more convulsions occurred, and treatment now took the course of the Rotunda method, i.e., no diet was allowed and the patient was made to drink seven pints of barley water per day until forty ounces of urine were passed on two consecutive days. Fairly large doses of mist. sennae. co. were persisted in. By the 29th October

the patient was having milk foods, and as her albuminuria cleared up she rapidly returned to normal diet. Her baby was bottle fed.

13th November, 1926. - Mother and child were discharged well. This patient has been seen at monthly intervals since, and remains free of albumin, blood pressure 120 mm. Hg.

An examination of the method used in treating the case described above will demand further information on four main details; venesection, the use of sodium luminal to replace chloral hydrate, the employment of intravenous magnesium sulphate, and the value of the diuretic ephyllin.

Phlebotomy, as I have already stated, was one of the earliest treatments used in eclampsia, and latterly, in many quarters, it has fallen into disrepute, due, I firmly believe, to a lack of careful selection of the cases in which it was performed. In the case of a stout, plethoric woman, with a high blood pressure, no one could reasonably say that the withdrawal of from ten to twenty ounces of blood would be a dangerous procedure, and, on the other hand, no reasonable clinician would advise venesection in the case of a thin, anaemic woman, however much raised the blood pressure might be. Generally speaking, and with many admitted exceptions, the eclamptic is neither anaemic nor of mean physique. She is more often well-nourished, inclined to be of a florid type, and, up to the time of onset of her present illness, active and healthy. In ten cases where I had blood counts estimated before treatment, the red cell count was always in the neighbourhood of the normal. When I see a thin, evidently anaemic pregnant woman with convulsions, and considerable oedema, I feel reasonably sure that I am dealing with a uraemia following

nephritis, and aggravated by the pregnancy, rather than a true eclampsia. This has been supported on many occasions by pathological reports. Some investigators have made it a practice to remove at least fifteen to twenty ounces of blood in every case where the operation is performed. This again is a dangerous routine, liable to bring a method of treatment into discredit, for in many cases the withdrawal of four to ten ounces of blood is sufficient to bring about the most beneficial results. I have performed venesection on fourteen of my group of nineteen cases; I have not, so far, had cause to regret doing so, and I feel that the procedure has been beneficial in four main directions. In the first place, it reduces the blood pressure, and decreases the frequency of convulsions. High blood pressure associated with eclampsia predisposes to the occurrence of cerebral haemorrhages; in cases where venesection has been performed, these lesions seldom occur. Secondly, where there is cyanosis and evident over-distension of the right auricle, venesection may be an immediate life-saving factor. Thirdly, venesection extracts a certain percentage of the toxaemic products. Admittedly, this point is stronger in theory than actuality, nevertheless it is worth remarking upon. Finally, venesection is of primary importance in that it promotes diuresis, the most desirable object in the treatment of eclampsia. It has been no uncommon occurrence in practically anuric patients to find as much as ten ounces of urine passed spontaneously within a few hours of venesection. As a rule I do not perform venesection unless the blood pressure exceeds 150 mm. Hg., but even this stipulation I disregarded in

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two cases where the rectal temperature exceeded 130 F., and convulsions were frequent and prolonged. The convulsions in both instances ceased within an hour of the venesection and did not recur. When the veins are of fair size I withdraw blood by the simple insertion of a large hollow needle, a congesting band having been applied to the upper arm; if there is any difficulty, however, it is a simple matter to dissect out a vein, and tie in a canula. As already mentioned, I am largely guided as to the amount to be drawn off by a sphygmomanometer applied to the other arm, and consulted from time to time. I never follow the advice of certain authors in replacing the blood by some such medium as saline or citrated blood from a suitable donor; by so doing the primary objects of venesection are defeated.

Sodium luminal is a most valuable sedative drug in the treatment of eclampsia, and is superior in every way to chloral hydrate. Moreover, according to Professor Werner, who carried out considerable research with this drug, it has a specific dilating effect upon the cerebral vessels, and thus is more useful than any ordinary narcotic in controlling convulsions. Its usefulness was first demonstrated in the treatment of epilepsy as an oral medication. Since, however, in eclampsia, this method of administration is often very difficult, and because as rapid an effect as possible is required, other methods of employing the drug have been tried. I have given sodium luminal in five grain doses through a stomach tube, and rectally; in doses up to three grains

hypodermically and intramuscularly; and in a dose of two grains intravenously. In no case has there been any untoward effect, excepting after the intravenous injection, which was only tried on one patient. Here, the rapidly recurring convulsions ceased almost immediately, but a deep coma ensued, from which the patient only recovered after a very trying period, in which artificial respiration had, on several occasions, to be employed. On the whole, the best and most sustained results have been obtained by intramuscular injections of one and a half to two grains of the drug, and as a routine procedure I use one cubic centimetre of a ten per cent solution i.e. approximately one and a half grains. Used in this way sodium luminal is safer, and much less toxic than morphia; it is not a cardiac depressant as chloral hydrate certainly is in the two gramme doses prescribed by Stroganoff, and its effect is more sustained.

A solution of magnesium sulphate, usually from ten to twenty per cent., injected intrathecally, formed for years a recommended treatment in the control of tetanic convulsions, and it was in this way that I first experimented with the drug in eclampsia. In most cases a sharp fall in blood pressure occurred, rather similar to that following injections of veratrine. Convulsions were certainly less severe, but seldom decreased in number. Experimenting on the other properties of the drug, I then commenced to employ it for its well-recognised synergistic action, enhancing the sedative effect of comparatively small doses of morphia. The normal respiratory rate in the patient moderately narcotised,

according to Stroganoff's plan, is from fourteen to eighteen per minute, which rapidly increases as the effect of the morphia wears off. If, however, 30 c.c. of a ten per cent solution of magnesium sulphate are given intravenously shortly after the preliminary dose of morphia, a respiratory rate of twelve to sixteen is commonly noticed, sustained for a longer period. In my early work on this subject I have used more concentrated and larger doses of magnesium sulphate, producing in one patient a respiratory rate of seven per minute which lasted for fully two hours. This feature was not observed when similar doses of magnesium sulphate were administered without morphia. The introduction of intravenous magnesium sulphate into the treatment of cases of eclampsia has enabled me to decrease Stroganoff's initial dose of morphia from one third of a grain or more to one quarter of a grain, and to use no more than three quarters of a grain of the drug in all, during the twenty-one hours of treatment. The reason for giving the magnesium sulphate intravenously is that it acts more rapidly thus than per rectum or intramuscularly, and also because, following a venesection, it is easily introduced through the same canula or needle as that already used to withdraw blood. Because magnesium sulphate certainly contributes to a fall in blood pressure, I do not employ it in comatose or semi-comatose patients with delirium and already decreasing arterial tension; otherwise I use it as a routine and regard an injection of 30 c.c. as the most useful preliminary dose, which has no tendency to exercise any paralytic effect upon the respiratory centre. If necessary, subsequent

injections of morphia may each be accompanied by 20 c.c. of a ten per cent. solution intravenously. Recently Lazard and Vruwink (American Journal of Obstetrics and Gynaecology) have published results in a series of cases treated simply by magnesium sulphate intravenously and intramuscularly, and chloral hydrate. Although these authors claim excellent results, my own experience has not lead me to believe that this method is sufficient of itself to control a severe case of eclampsia.

The best method of securing diuresis in eclampsia is to perform venesection, but this method is not feasible in all cases, so that apart from hot packs or poultices to the posterior renal areas, and the radiant heat bath, it is useful to experiment with the diuretic drugs, both hypodermically and by mouth. In the absolute anuria which sometimes characterises cases of eclampsia, almost always progressing to a fatal termination, there is only one drug which I have seen of the least assistance, and that is euphyllin. Euphyllin is put up in ampoules, each containing .4 of a gramme, and it is best used in this way, as the dry powder is extremely insoluble, readily crystallising out in any but the weakest dilutions. The drug is nontoxic in the dose stated, and it may be repeated if necessary, in an hour or two. Not only is it diuretic, but, as Professor Vogl of Vienna has recently shown, it supplies a direct stimulus to the respiratory centre. This is of great importance, for in cases where the breathing is shallow, or the Cheyne-Stokes type, it rapidly remedies these features without influencing the convulsions, as would other respiratory

stimulants, such as strychnine. In conscious patients, or in the convalescent stage, I employ theosin sodium acetate as a diuretic in three grain doses three times a day, by mouth. In some cases it has proved very useful.

As regards the actual nursing of the eclamptic patient, I have little to add to the excellent principles laid down by Stroganoff. The patient is kept in the Sims position, with the back of the head raised and the mouth dependent to prevent the inspiration of blood and saliva. Special steps are taken to keep the mouth and pharynx clear of mucus, and where pulmonary oedema is a troublesome complication, the initial one hundredth of a grain dose of atropine sulphate is repeated. The catheter is used at twelve hourly intervals, and the urine measured, as the amount passed forms a helpful guide as to the progress of the case. Oxygen is administered by nasal tube for a few minutes at a time during and immediately after convulsions. Gas and oxygen is used because it is less of a protoplasmic poison than the other anaesthetics. Ether decidedly increases the risk of pulmonary oedema, and chloroform, whilst less harmful from this point of view, seems to further the fatty degenerative processes already liable to affect the liver and myocardium in eclampsia. When labour complicates eclampsia, there would appear to be only one fact to remember, - that recovery varies inversely with the degree of manipulation. In the majority of cases nothing more is required than a simple vaginal examination, with the patient under light anaesthesia. This should be sufficient to ascertain whether the patient is

in labour or not, and, if she is, whether the presentation is a normal one. Unless delivery is impossible without manipulation, I never do more than to shorten the second stage by the application of forceps, when the cervix is fully dilated and the head on the perineum. In the few cases where living infants were obtained I have always had them bottle-fed, as breast-feeding is neither to the advantage of the mother nor her child after an attack of eclampsia.

I would like next to make some mention of two drugs which I never use in the treatment of eclampsia; these are pituitrin and veratrone. Pituitrin is particularly dangerous in this disease, as it increases the cerebral arterial tension, stimulating the occurrence of convulsions, and also of cerebral haemorrhage.

I have seen a case that has responded well to the Dublin technique and her convulsions had ceased. She had been in labour for a considerable time with the cervix fully dilated and, a diagnosis of uterine inertia having been made, 1 c.c. of pituitrin was administered to hasten matters. The patient died suddenly as the infant was being delivered. A post mortem was made and numerous small cerebral haemorrhages were discovered, and I account for their origin by the rise in blood pressure provoked by the pituitrin.

Veratrone is a drug whose results cannot be guaranteed. In some cases it produces no effect whatever; in others it brings about a marked and rapid reduction in blood pressure, often associated with severe depression and dangerous shock, the antidote to which is extremely difficult to find.

In those cases in which veratrine would be indicated by its supporters I perform venesection, a measure which is easier to control, and productive of more lasting results.

A description of the remaining eighteen cases will now be given, and I have placed them in order of admission to hospital, the case book number being inserted before each:-

50866. *Unine ?* Primipara, age 43, 7 months pregnant, albuminuria recognised 14 days previously but patient refused to stay in bed or to accept a limited diet. Convulsions commenced 9 p.m. admitted 2 o'clock the following morning in labour, unconscious but very restless. Blood pressure 150 m.m. Hg. Routine treatment carried out. Venesection to 8 ounces. Became conscious 12 hours after admission. Spontaneous delivery during a convulsion 15 hours after admission. Small living child, which died following day. Total number of convulsions before delivery 6, following delivery 2. Stay in Hospital 3 weeks, discharged with faint trace of albumin. B.P. 130.
51334. *Unine ?* Unipara, age 36, 5 months pregnant, last pregnancy normal, history of pre-eclamptic symptoms for 3 days. 2 fits before admission. B.P. 180. Pulse 80 very full. A strong, florid looking subject, with some oedema of the legs. Very drowsy, not in labour. Routine treatment. Venesection about 15 ounces, after which urine passed freely. Number of convulsions after admission 3. The Rotunda treatment commenced on day after admission, and continued with a condition not entirely satisfactory as regards urinary elimination. Some days after admission delivered of macerated foetus. Fits after delivery - Nil. Uneventful recovery, discharged in three weeks free of albumin.
51918. Primipara, aged 21, seven months pregnant, unmarried. No oedema, thin and wasted. History of Sanatorium treatment for tuberculosis. Admitted unconscious having had 4 convulsions, not in labour. Outside treatment, morphia $\frac{1}{2}$ gr. and chloroform. B.P. 125. Routine treatment modified - no initial dose of morphia, no venesection. Dose of luminal increased to 2 cc. (3 gr.) 8 convulsions in 24 hours after admission. Anuria was a prominent feature of this case, diuresis after 2 ampoules of euphyllin, followed by considerable improvement and cessation of convulsions. Pathological report showed renal type of pregnant

intoxication. 3 days after admission labour induced by introduction of bougies - dead born premature infant. Discharged after 4 weeks in Hospital, condition much improved, had put on weight and was albumin free.

52667. Primipara, aged 39, full term, History only of severe headache, followed by 3 convulsions, commencing 1 hour before admission. Tall, stout, very oedematous subject, in labour. B.P. 200 mm. Hg. Immediate venesection 20 ounces, and routine treatment commenced. 2 prolonged convulsions after admission, but none following venesection. In 3 hours head was on perineum. Forceps delivery. Living child. One slight convulsion after delivery. Complained during convalescence of gradual deterioration of sight. Oculist's report "Papilloedema" large amount of exudage scattered over central portions of both fundi - prognosis good. Discharged 4 weeks after admission. Sight slightly improved. Seen 4 months later vision practically normal.
52737. Multipara, aged 31, 7 months pregnant. Previous pregnancies normal. History of one convulsion before admission, not in labour. Marked oedema of lower limbs, and large varicose veins. B.P. 150, conscious. Abdomen very large - diagnosis of hydramnios or twin pregnancy. No venesection, but magnesium sulphate 30 c.c. given intravenously as usual, otherwise routine treatment. Three slight convulsions, which then ceased until following day. Convulsions recurred, treatment recommenced. As labour had now started membranes were ruptured. Natural delivery of premature twins, both living, but died within two hours of birth. Discharged in 14 days, very well.
53040. Unipara, 26 years, 8 months pregnant. Two convulsions before admission. Mild case, no special features. Venesection - 12 ounces, only one convulsion after admission. Macerated foetus expelled 3 days after admission. Stay in Hospital 3 weeks.
53199. (A most interesting case of recurrent eclampsia). Primipara, aged 36, 6 months pregnant, not in labour. Slight oedema. Admitted unconscious with history of numerous convulsions. B.P. 170 mm. Hg., very cyanosed. Venesection - 20 ounces. Routine treatment; became conscious within 24 hours of admission. Discharged after 3 weeks free of albumin. Cautioned as to diet etc.

Two months later re-admitted in precisely the same condition as before. Urine solid with albumin B.P. 180 mm. Hg. Routine treatment, including

venesection to 20 ounces. Dead born child delivered naturally on day following admission. Discharged 14 days later, well, and free of albumin.

53469. Unipara, aged 33, 7 months pregnant. Previous pregnancy twins. Oedema of vulva and abdominal wall. B.P. 160 mmg. Hg. Several convulsions before admission. Routine treatment, venesection to 8 ounces. Only one convulsion after admission. Recovered very well, and discharged in 14 days free of albumin. Seen at Hospital each week, and admitted just before term because of slight recurrent albuminuria. Delivered of living male child, 8 pounds.
54222. Primipara, aged 29, unmarried, full term. No oedema. History of two convulsions, one each day for two consecutive days before admission. Admitted in labour and conscious. B.P. 170 mm. Hg. Rotunda treatment commenced, but abandoned after development of three severe convulsions. Routine treatment, venesection - 15 ounces, Delivered of living child 14 hours after admission. Three slight convulsions following delivery. Discharged at own request 12 days after admission, had trace of albumin.
54365. Aged 40, Admitted at night, having been delivered of a first child, dead born, at term, earlier on same day. History of pre-eclamptic symptoms before delivery, but no convulsions. Four convulsions before admission to Hospital, B.P. 150 mm. Hg. Unconscious. Routine treatment commenced without venesection, but two injections of intravenous magnesium sulphate, each 30 c.c. of ten per cent solution, administered. Eight convulsions before ultimate recovery. Discharged after 16 days. Remains well.
54692. Primipara, aged 44, not in labour. A case of average severity, presenting no especial features. Responded well to routine treatment with venesection and discharged after three weeks. Confined at own home of macerated foetus.
54999. Unipara - aged 33. History of intrapartum eclampsia in first pregnancy. Already an in-patient, with albuminuria and pre-eclamptic symptoms at term. Labour commenced, and progressed normally, a living male child being secured. On day following delivery she complained of severe headache, and shortly afterwards had a severe convulsion. B.P. 190 mm. Hg. Routine treatment, including venesection 12 ounces. Two more convulsions occurred, after which she recovered well, and was discharged 14 days after confinement.

55283. (The youngest case I have heard recorded). Primipara, aged 17, unmarried, 6 months pregnant. Oedema of lower limbs. History of many convulsions at home. B.P. 140 mm. Hg. Routine treatment without venesection, but after occurrence of 11 more convulsions venesection performed to 10 ounces. B.P. reduced to 110 m.m. Hg. After this convulsion ceased, and patient recovered. Headache and other pre-eclamptic signs remained, however, until 3 weeks later, when we expelled a macerated foetus.
55431. Multipara, aged 37, 8 months pregnant. No abnormality in previous pregnancies. Admitted as mild case of intra-partum eclampsia. B.P. 130 m.m. Hg. History of three convulsions outside. Routine treatment without venesection. Only one slight convulsion as a living female child was expelled. Recovered well. Both discharged in 18 days, mother had trace of albumin.
55850. Multipara, aged 39, 7 months pregnant. History of one convulsion before first child was born, second still born at 6 months. Not in labour. B.P. 170 m.m. Hg. Three convulsions before admission, Routine treatment, including venesection - 14 ounces. Four convulsions during 24 hours. Recovered well, and was delivered of macerated foetus. Stay in Hospital 3 weeks.
56001. Primipara, aged 30, 5 months pregnant. B.P. 180 m.m. Hg. One convulsion at home, two in Hospital. A mild case, which responded well to routine treatment, including venesection - 15 ounces. Is now at home, and pregnancy continues.
56306. Primipara, aged 21, full term pregnancy. In labour. B.P. 150 m.m. Hg. Two convulsions before admission, four following admission. Routine treatment, but no venesection. Delivered 8 hours after admission of living female child. Three slight convulsions following delivery. Recovered well, and was discharged in 16 days free of albumin.
56362. Multipara, aged 38, 7 months pregnant, six children previously, all normal pregnancies. Re-married before present pregnancy. Not in labour. History of pre-eclamptic symptoms lasting one week, followed by numerous convulsions. Treated for one day at home with morphia and hyoscime, together with rupture of the membranes. Admitted with B.P. 190 m.m. Hg. Pulse rate 110. Two convulsions during conveyance to ward. Venesection to 20 ounces, and routine treatment, using 20 c.c. of 10% solution of magnesium sulphate after each convulsion, and 2½ gr. doses of

sodium luminal. Convulsions ceased, labour commenced, and dead born premature child delivered. Total number of convulsions in Hospital 9. Patient recovered.

The following are points of statistical interest culled from this group of nineteen cases:-

Mortality rate.

Maternal - Nil.
Foetal - 65%.

Number of pregnancies.

Primiparae - 11 cases.
Uniparae - 4 "
Multiparae - 4 "

Duration of pregnancy.

5 months pregnant	- 2	"	This group includes the instance of primary eclampsia at six months followed by recurrent eclampsia at 8 months.
6 " "	- 3	"	
7 " "	- 6	"	
8 " "	- 3	"	
At or about term	- 4	"	
Following delivery	- 2	"	

Age of patient. (varied between 17 years and 44 years).

Under 20 years - 1 case.
Between 20 & 30 " - 5 cases.
" 30 & 40 " - 9 "
Over 40 " - 4 "

Systolic blood pressure.

Highest recorded - 210 mm. Hg.
Average. - 155 mm. Hg.
Lowest recorded - 125 mm. Hg.

Induction of labour.

Only performed in one instance.

Unmarried cases.

Three cases were unmarried, this is a point upon which stress is laid by some authorities, as of etiological importance.

In his most recent series of eighty cases Stroganoff has reported a recovery rate of 100%. He also maintains that in unneglected cases the maternal recovery rate should remain at this high standard and that the probability of preserving the life of the child should be in the neighbourhood of 90%. Although I am able to record 19 successfully treated cases of eclampsia my group does not include a single instance of fulminating eclampsia, of eclampsia without convulsions, or of eclampsia complicated by some condition such as placenta praevia, contracted pelvis, or abnormal presentation of the foetus.

Had cases of this description been admitted I fear that these statistics would have been considerably altered.

I cannot conclude without thanking Mr. Lloyd Davies for permission to publish the notes on the cases.

C O N C L U S I O N S

1. Ante-natal supervision is of prime importance especially in the prevention of eclampsia.
2. Treatment can be too stringent, and surgical interference is contra-indicated except in the case of an occasional Caesarian section for an obstructed labour.
3. The Rotunda method is satisfactory but the Stroganoff yields better results.
4. The quantity of morphia given by Stroganoff is too large, but in introducing luminal for morphia and the more frequent use of venesection the most satisfactory results are obtained.
5. The use of Ether is dangerous, because it increases the risk of pulmonary oedema.
6. Gas and oxygen is the ideal anaesthetic, if not available Chloroform.
7. Pituitrin is contra-indicated in eclampsia.
8. Recovery varies inversely with the degree of manipulation.

B I B L I O G R A P H Y

Mauriceau. "Traite des Maladies des Femmes Grosses."

Paris 1694.

"The Rotunda Treatment of Eclampsia". Lancet extra numbers.

No. 1.

Aleck W. Bourne. "Recent Advances in Obstetrics & Gynaecology.

Churchill, 1926.

G.W. Kosmak. "The Toxaemias of Pregnancy." Appleton, 1922.

Wesselow and Wyatt. "Modern Views on the Toxaemias of

Pregnancy." 1924.

"Report of the London Committee, appointed by the Section of
Obstetrics and Gynaecology of the Royal Society of Medicine."

Gehler, J.G. "Kleine Schriften uber Entbindungskunst."

Leipzig, 1796.

"The Writings of Hippocrates and Galen." Lindsay and Blakeston,

Philadelphia.

E.M. Lazare, J.C. Irwin and J. Vruwink. "Treatment of

Eclampsia," American Journal of Obstetrics and Gynaecology,

July, 1926.

A. Hochenbichler. "Treatment of Eclampsia at Third Maternity

Hospital, Vienna." Zentralblat. f. Gynak., February, 1927.

H. Elwyn. "Etiology of Eclampsia." American Journal of

Obstetrics and Gynaecology, November, 1925.

D. Deutschman. (Medical Journal and Record). "Painless

Childbirth by the Synergistic method of Gwathmey." October, 1926

S. Berman. "Conservative Treatment of Eclampsia" (Boston

Medical and Surgical Journal) January, 1926.

BIBLIOGRAPHY (continued).

C. Clemmesen. "Epilepsy and Pregnancy". Ugeskrift fur Laeger, October, 1926.

J. Hofbaner. "The Toxaemias of Pregnancy." American Journal of Obstetrics and Gynaecology, August, 1926.

V.J. Harding and H.B. Van Wyck. "Diet in Pre-eclamptic State." Journal of Obstetrics & Gynaecology of the British Empire, 1926 (Spring number).

Zangemeister. "Etiology of Eclampsia." Med. Klin. January, 1926.

H.M.von Mengershausen. "Treatment of Eclampsia." South African Medical Record, September, 1925.

T.L.Hardy. "The Treatment of Uraemia." Lancet Special Article CCXII.

Hamilton, Alex. "Treatise on Midwifery." Edinburgh, 1871.

Brunet. G. "Heber die Sogenannte Eklampsie ohne Krampfe." 1908.

H. Spencer. "History of British Midwifery." 1927.

Synder. J.W. "Eclampsia and Lumbar Puncture." Journal A.M.A. September, 1917.

Johnstone, R.W. "Text book of Midwifery." 1923.

