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## Termination of pregnancy in eclampsia

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TERMINATION OF PREGNANCY IN ECLAMPSIA

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# TERMINATION OF PREGNANCY IN ECLAMPSIA

## INTRODUCTION

"Eclampsia, and the forms of toxemia associated with it, cause, annually, about thirty percent of the approximately 15,000 maternal deaths in this country. There are many of the women who survive the convulsions and acute stages, or who recover from severe, non-convulsive forms of toxemia and have permanent vascular or renal disease which impairs their health and shortens their lives." Certainly this quotation from the American Committee on Maternal Welfare(1) is enough to arouse the interest of any medically minded person, and justify him in whatever effort he may put into the study of this disease.

It has been said that in treating any of the toxemias of pregnancy the physician is concerned in treating two separate conditions, the toxemia, and the pregnancy. For a number of years it has been the practice of many if not most of the physicians to treat the eclampsia and let the pregnancy, to a great extent, look after itself. It is true that great progress has been made by the so-called conservative treatment of eclampsia, but the author was forced to wonder if the termination of pregnancy did

not still have a proper and justifiable place in the treatment of eclampsia. Also, the question of the proper treatment of the pregnancy for the greatest safety of the mother and the child has come to the authors mind.

While this paper shall deal primarily with the problem of the termination of pregnancy in eclampsia, some discussion of other phases of eclampsia will be necessary to clarify the views of the various authors whose works are used in the construction of the portion dealing with the particular subject at hand, the termination of pregnancy in eclampsia.

#### DEFINITION

Eclampsia, according to DeLee (6) is not a disease by itself, but only the symptom, the most outstanding one, of several underlying diseases; and, before the convulsions (eclampsia) break out, we have a stage, more or less long, full of symptoms and signs of the most varied nature, which serve to call out attention to what is pending. Most authors agree that the symptoms which usher in the actual eclamptic state vary to some degree in each individual depending upon the pathology present, but the most common-

ly found and most prominent symptoms are, rapid gain in weight, increasing blood pressure, albuminuria, restlessness, irritability, headache, epigastric pain, and vomiting. This definition is rather indefinite and bulky, and for the sake of brevity, it might be said that eclampsia is a condition, probably resulting from a toxemia, under which may be classed all cases of convulsions in pregnant women not explained by extraneous medical causes.

DeLee (6) considers that most cases of eclampsia fall into one of four groups as follows:

I. The True Toxemia; in which there is a circulating toxin damaging chiefly the liver and secondarily the kidneys, the vascular and the endothelial system.

II. Acute Nephritis; brought about by some focal infection, or one of the usual causes of nephritis, but most frequently by the toxins of pregnancy.

III. Chronic Nephritis; when the patient with damaged kidneys becomes pregnant thus putting an added strain on the kidneys the organs are apt to break down, or if there is a tendency to eclampsia the convulsions break out.

IV. Malignant Hypertension; whatever be the cause

of increased arterial tension, if pregnancy is added to the burden already carried by the vital organs convulsions or coma will result if there is a tendency to eclampsia.

While there are many theories, classifications, and rather varient definitions of eclampsia, these have been accepted to serve as a standard to be used in this paper. The subject of eclampsia is confusing enough without attempting to satisfy the whims of every worker.

#### HISTORY

Eclampsia has been a problem for many hundred and probably thousands of years. The Old Testament refers to the condition of Rachel, the wife of Jacob in her second delivery, and according to Fair, it is reasonable to believe that she died from a severe Toxemia or convulsions of pregnancy. In the writing of Hippocrates, the convulsive seizures are alluded to. It is from his native language the term eclampsia is derived. Kosmak could find no references to the disease in the medieval literature, other than a casual mentioning of it by Italian writers.

One thing soon became apparent in the study of



the history of eclampsia, namely, that from the earliest times to the present day, the question has always been,-- shall the patient be delivered immediately in order to relieve the convulsions, or shall she be treated more safely with medical measures?

A specific discussion of eclampsia is found in 1668 when Mauriceau recommended free venesection and rapid delivery by version; but in 1697 Chamberlin urged forceps as a better procedure. Amverg in 1713 clearly describes a case, and Kosmak in his monograph quotes him as follows, "Phlebotomy in the arm immediately to eight ounces, a teaspoonful every morning of a nervous powder to be repeated in the afternoon at four o'clock and at bedtime. The patient had not more convulsions and was delivered of a healthful child." Thus was the conservative attitude exemplified for the first time.

To the contrary in 1775 and 1777 references were being made to the radical treatment. Smyly's Text-book reporting four cases of eclampsia with three versions followed by recovery. Shortly after Madam Le Bousire De Coudray, chief midwife of Paris, said, "Absolute rest is essential for the control of the convulsions, and the patience if the presentation is

normal, unless she falls into a state of lethargy, with all the resources of animal economy being exhausted with nothing left to assist in giving birth, that the delivery must be made as promptly as possible."

Next came the advent of chloroform in 1831 and then ether in 1857 for the control of the convulsions. In 1867 chloral hydrate came into use as a depressant for the control of the convulsions.

Towards the last of the Nineteenth century opposing views were distinctly found. Campbell, urging opium and venesection, and Halbertsma advocating cesarean section. Veit in 1887 perfected ideas about the liberal use of morphine which spread rapidly. In 1892 Duhressen believed delivery was indicated and advised the use of his method of incising the cervix to replace accouchment force. In 1900 Stroganoff gave a distinct impetus to the conservative management by reporting his routine use of morphine, chloral hydrate and sodium bromide with only 6% mortality. However, some continued enthusiastic over the radical method, and in 1904 Sir Comyns Berkley sought an answer to this perplexing situation by making a survey of the methods used by the leaders in England. He was unable to draw any definite conclusions, but was

prompted to say, "possibly eclampsia was like puerperal fever, a symptom of a number of separate and distinct diseases, and, therefore, the results of treatment might differ according to which variety one was treating."

From 1905 until 1922 there was much said for both the conservative treatment and for the conservative combined with the radical, while the purely radical methods lost favor. In 1922 Mc Pherson blazed the way for a new wave of conservatism which has been very well carried on to date. ( Historical notes from, J.R. Reinverger and P.C.Schreier, 52)

#### ETIOLOGY

It would be possible to write at great length upon the etiology of eclampsia, but only reviewing the mass of literature that has been published would probably bring one no nearer the solution of this problem than when he started. Only the most significant shall be discussed. By this the author does not mean the most important points, or those most closely approaching the truth, but rather, those which have been given the greatest consideration and possibly the greatest publicity. The number of theories which

have been brought forward in an attempt to explain the condition are legion, but the disease still remains "the disease of theories." (Boyd,3)

That certain factors predispose to eclampsia are well known. The most important of these are: primiparity, especially in advanced years; neurotic constitution; certain types of endocrinopathy; infantilism; multiple pregnancy; heredity; previous disease of the liver or kidneys; and season of the year. (DeLee,6)

As to the primary etiological factor in eclampsia the definition of the disease as previously given provides that pregnancy must be present, and that there must be no evidence of extraneous medical causes. This then would point to a definite relationship between the condition and the pregnancy. LaVake(34) says that the disease can be explained only on the theory that toxins of the fertilized ovum effect the maternal organism. DeLee(6) says that the most plausible theory is that eclampsia is one form of toxemia causing perversion of metabolism of a physico-chemical nature, and that some noxa circulates in the blood which upsets the water-balance, effects liver changes, and, directly or secondarily, degenerative

changes in the kidneys and also convulsions by direct toxic action on the anterior cerebral cortex. Any statement as to the actual source of this toxic agent is carefully avoided, admitting that the real cause of the affection is not known. Boyd(3) and others have pointed out that one of the outstanding facts is the cure which often follows the emptying of the uterus, suggesting that some poison is manufactured either in the fetus or in the placenta. He points out to that the occurrence of eclampsia during the puerperium suggests that the fetus and placenta can not be the only factors at fault.

To date the most plausible theory is that the pregnancy is the chief etiological factor in the production of eclampsia, but other factors deserve mention. Boyd(3) credits Hynd with a theory suggesting an anaphylactic reaction, due to foreign protein, and Theobald with some work showing that increased intraabdominal pressure may play a role, but concludes by saying that it appears probable that future work will show that eclampsia is not a single disease, but a group of conditions which may be traced to different factors.

Harden(21) gives as etiological factors, body type, inadequate food selection both quantitative and

quantitative, endocrine unbalance, and anemia from poor nutrition. He stresses the importance of protein balance in the diet.

Brown and Dodds(4) after testing the blood pressure of a number of babies from hypertensive toxemic mothers, and finding their blood pressure quite uniformly normal, concluded that this particular phase of eclampsia could not be due to a substance carried in the blood stream, and capable of crossing from the maternal to the fetal circulation.

Stream(60) felt that the toxin came from the paternal element of the fetus and had some success in desensitizing the mother to the paternal elements.

Stander(58) and Titus(67) have long argued about the role of the blood sugar in eclampsia, but no definite conclusions have been reached from reviewing their work.

For a rather comprehensive review of the possible etiological factors as they occur under the headings of uremia, bacteriology, dietetics, metabolism, endocrinology, relations of mother and ovum, and hematology the reader is referred to DeLee(6). All of this leads to nothing except that it be that there is a definite relation between the pregnancy and the

eclamptic state.

Individual convulsions in a case of eclampsia may be elicited by any external irritant. DeLee(6) gives such factors as jarring the bed, slamming of doors, bright lights, an enema, catheterization, induction of labor, and possibly increased intracranial pressure as possible immediate causes for the eclamptic seizure.

According to Williams(76) eclampsia occurs in one out of every 500 labors. Various authors are credited by DeLee with figures which differ sharply as to the percentage of cases occurring before, during, and after labor. It appears however, that about 80% of the cases occur late in pregnancy or during labor. The other 20% percent occur either early in pregnancy or relatively shortly after labor. Several authors agree that the convulsions occur most commonly just at the onset of labor.

#### CLINICAL COURSE

The clinical course of eclampsia will vary rather greatly in the individual cases depending upon the type and degree of pathology present. The speed of onset of the symptoms will also vary widely, but us-

ually there are symptoms and findings which give warning of the impending danger for days or weeks before the actual onset of the convulsions.

Williams(76), DeLee(6) and others agree that in general the women complain of debility, a tendency to sleep or nervous excitation, giddiness, slight mental confusion, twitching of the muscles, anorexia, and muscle cramps which become more marked as the case progresses. Headache, dullness, disturbances of the special senses, especially sight and hearing are found later. Nausea, vomiting and pain in the epigastrium are the most ominous symptoms, and precede the convulsions only by hours or a day at the most.

Physical examination reveals edema of the feet and eyelids, more or less general anasarca, with pasty skin, a coated tongue, fetid breath and rather late tenderness over the epigastrium. Hallum(20) places great emphasis upon the eye ground changes of the angio-spastic type which are associated with the elevated blood pressure. McCord(36) stresses an abnormal weight gain as very significant. All are agreed that the blood pressure is elevated often to above 200mm of mercury.

Laboratory procedures show an almost constant



albuminuria, and a frequent associated anemia. Titus(67) and Stander(58) have done much work on the blood sugar levels, and while there has been a great deal of discussion of Hypoglycemia and Hyperglycemia it was difficult for the author to reach any conclusion except that there are some blood sugar changes present in many cases of eclampsia. Eden, et.al.(12) record a wider range of normal for renal clearance tests in pregnant women, but even taking this into consideration there is proved impairment of renal function in many of the toxic patients. This is exhibited not only by the clearance tests but by the decreased urinary output. Gustafson(18) describes decreasing carbon dioxide combining power of the blood as significant.

The eclamptic convulsion has been described very adequately by DeLee(6) from whose writing the author will take a portion of the description.

After the above described prodromata, the patient falls in to a fewseconds of quiet unconsciousness, a few twitching of the facial muscles occur. The pupils dilate, the eyes and head are turned to one side, the mouth is opened and the patient may groan. The whole body becomes rigid in a tonic spasm. This

condition lasts a few seconds and then the facial muscles followed by those of the entire body undergo twitchings. Foam often tinted with blood comes from the mouth, respirations may stop, the pulse becomes rapid and strong but then later weakens. The patient becomes cyanotic, the face and lips swollen. Gradually the convulsions cease, stertorous breathing becomes established and the patient passes into a deep coma. The convulsions last from thirty seconds to two minutes and may be single or follow one another closely.

#### PATHOLOGY

With the various types of eclampsia as classified previously there are to be expected rather wide variance in the pathological changes present. The pathology presented briefly here will be that found most commonly in cases of eclampsia.

Most writer agree that the most marked pathological changes are to be found in the liver, which according to Boyd(3) are chiefly hemorrhagic patches of varying size. Under the microscope there is a considerable degree of necrosis of the liver cells in the hemorrhagic areas. The distribution of the

lesions is according to Boyd(3) characteristically in the periphery of the lobule about the central vein although according to others it may be either peripheral or central. There seems to be no association between the severity of the symptoms and the degree of liver damage.

Boyd(3) and DeLee(6) agree that the kidney changes which are almost always present are secondary. There is found, cloudy swelling, fatty degeneration and necrosis of the renal tubules and glomeruli. Boyd believes, contrary to many others, that there is no marked impairment of renal function.

The brain shows flattening and moderate edema of the convolutions, sometimes with anemia, sometimes with congestion. Small or large hemorrhages or cerebral softening with thrombosis are found in a high percentage(85%) of autopsies. (DeLee,6) Harden(21) feels that pituitary hypertrophy is normal in pregnancy, while others point to this condition as a possible significant point in eclampsia.

DeLee(6) states that often the heart muscle is fatty and may show tiny hemorrhages, necrosis, and thrombi. The fine vessels throughout the body may show thrombosis and emboli of liver-cells, endo-

thelial cells, and syncytium. The blood contains an excess of fibrin and coagulates quickly. The lungs almost always show congestion and edema and often hemorrhages under pleura. Broncho-pneumonia on an aspiration basis is not uncommon.

The eyegrounds as described by Hallum(20) may show changes varying from angio-spasm and retinitis to partial or complete detachment of the retina.

Goodall(16) has described in considerable detail degenerative changes found in the placenta which he believes to be of considerable significance.

Changes have been found in the child which correspond to those in the mother, especially when the child died in convulsions. (DeLee,6)

#### DIAGNOSIS

Williams(76) points out that there may be some confusion of eclampsia with other conditions which might appear in pregnant women such as epilepsy, ur-emia, acute yellow atrophy of the liver, poisoning, and even hysteria. However, if the symptoms and signs previously described are considered and the above conditions ruled out the diagnosis should be definite and not particularly difficult.

### PROGNOSIS

In general the prognosis in eclampsia is not particularly favorable. The author has found statistics ranging from 6% to over 40% for maternal mortality, and according to many authors the fetal mortality is about 50%. There can be no general prognosis of each case must be decided individually after all of the evidence has been considered. Beside the toxic manifestations the physician must take into consideration the obstetrical problem and determine what type of labor or delivery is to be anticipated. For discussion this section takes up only a few of the opinions expressed by the various authors. There is in eclampsia not only to be considered the immediate prognosis as to life or death, but also the remote prognosis as to what effects of the condition will remain with the patient. Both of course will depend to a large extent upon the type of treatment used as will be seen in later.

Eden's work on the classification of eclampsia as given by Rucker(54) and Williams(76) is, despite various modifications by others, still the standard and probably the best basis to use in determination of prognosis. He considers the eclampsia severe if

two of the below signs are present and mild if only one is present. His significant findings are: prolonged coma; pulse over 120; temperature 103 degrees; blood pressure over 200mm.Hg.; more than 10 fits; 10 grams or more albumin in urine; and absence of edema. The mortality will be much higher in the severe group under this classification. Hallum(20) considers the the eye-ground changes as a most important prognostic sign. Gustafson(18) says that the minute a toxic patient has a convulsion her chances of recovery are materially lessend. A study of these points with consideration of other pathology present will give an estimate of immediate prognosis.

Many authorities are quite definite about the remote prognosis of eclampsia. Herrick and Tillman(26) give statistics showing and increased death rate in women who have previously had eclampsia, and claim most of this increase due to the glomerulonephritic and hypertensive sequellae of the disease. The American Committee on Maternal Welfare(1) has concluded that long continued toxemia is more apt, than a short severe toxemia, to give vascular and renal lesions which impare the health and shorten the lives of victims of eclampsia. Eden, Sinclair and Rogers (12)

found that sixty-seven percent of eclamptics sustained evidence of renal damage, and state that there is no increase in the extent of renal damage following the early termination of pregnancy, in contrast with the serious damage observed if the patients are allowed to go to term. Williams(76) and DeLee(6) both offer evidence that there is a definite morbidity found permanently in eclamptic patients.

The fetal mortality is high partially because of the number of premature births, but DeLee(6) points out that 20% of the viable children die and that the mortality increases with the number of convulsions the mother has before delivery.

#### PROPHYLAXIS

Kellogg(32) believes that there are two types of eclampsia, those developing as a result of poor care, and those developing in spite of the best of care. Most authors agree that good prenatal care can do a great deal in reducing the incidence and the severity of eclampsia. Williams(76) claims the prophylaxis in many ways more important than the attempted cure. He advises regular examination of the urine, blood pressure determination, and weight gain checks, and the

regular check for any other suspicious symptoms. He advises the immediate institution of appropriate dietary and medical treatment as soon as symptoms appear, with special reference to elimination. He feels that these precautionary measures, and the termination of pregnancy in cases which do not improve under treatment will reduce the occurrence of eclampsia and save many lives.

Harden(21) has done extensive work pointing to the fact that pre-eclamptic patients have a marked nitrogen loss, and by his "Protein Stabilization Treatment", which is essentially a program of assuring adequate protein intake, has treated 522 cases without a single case developing convulsions.

Gordon(17) claims that if the pre-eclamptic gets progressively worse under conservative management it is a definite indication for surgical treatment. Cesarean section is best if the child is viable, vaginal section if the child not viable. He recommends the use of spinal or local anesthesia exclusively.

Kellogg(32) is in favor of termination of pregnancy as a prophylactic measure if the patient continues downhill under adequate treatment. DeLee(6) advises periodic check-up for the symptoms and signs



of eclampsia. He lists three important factors in prophylactic treatment: 1. The diet should be so ordered that enough nitrogenous matter is given to sustain life. The food to be in the form easiest assimilated, and which will leave the least amount of waste which throws extra work on the kidneys and liver. 2. The kidneys should be aided to throw off the excess of poisons already in the blood. 3. Termination of pregnancy is to be considered.

Many other authors express the opinion, that if the patient with early symptoms of eclampsia does not respond to prophylactic treatment, the pregnancy should be terminated by one of the accepted methods. The choice of the method depending upon the condition of the patient, viability of the child, and obstetrical indications.

#### TREATMENT OF ECLAMPSIA

Since the cause or causes of eclampsia are not definitely known the treatment of the condition must remain empirical. As was seen in the study of the history of eclampsia there have been widely divergent types of treatment suggested for eclampsia. The best of these have been retained, the rest discarded.

The treatment of eclampsia today may be divided into two fundamental types, the conservative and the radical. These two types are combined to form a third or combined type. The author will discuss the radical and conservative types rather briefly and then deal with the combined method of treatment with indications and methods of termination of pregnancy.

#### CONSERVATIVE METHODS

There have been many conservative methods introduced since Stroganoff first described his method of controlling eclampsia. The results have been much better than those obtained by the radical methods, but there is still much to be desired. The conservative methods have come to be very generally recognized as the best for the control of the active convulsive states, but there is some question as to how long they should be continued, and as to which are the most satisfactory for general use.

Stroganoff's(63) original method consisted of one-quarter grain of morphine every two hours and chloral hydrate per rectum an hour after each dose of morphine. Beside this he insisted that the patient's surroundings be a quiet and restful as

quiet and restful as possible and that each convulsions be controlled by chloroform. The strict Stroganoff treatment is objected to today because of the use of chloroform. As a result there have been almost as many modifications of the Stroganoff treatment as there are proponents. In general, however, the treatment has remained one of depressing the patient to stop and prevent the convulsions. Stroganoff frowned upon operative intervention and carried the patient until labor began spontaneously at which time the membranes were ruptured. He has reported mortality rates as low as 1.7%. Peckham(47) believes that the modified Stroganoff treatment is the best so far found and gives a series of cases from Johns Hopkins with a mortality of 2.86% for mild and 24.27% for severe eclampsias, classified according to Eden. Plass(50) reports that the use of the modified Stroganoff method has reduced mortality to one half that found by the use of radical methods.

The Dublin treatment is not so popular as the Stroganoff, but equally good results have been reported for it. This method is based upon elimination rather than upon sedation. It consists chiefly of gastric lavage and colonic irrigation in an at-

tempt to rid the body of the toxins present. Paramore(46) is a proponent of this method and expresses the opinion that all drugs are to some extent harmful and should be avoided.

The Arnold method concerns itself with the dehydration of the patient, and consists chiefly of limiting the fluid intake, the use of diuresis and morphine to control the convulsions.

Titus et.al.(67) recommend the use of intravenous dextrose as a specific in eclampsia as it corrects the hypoglycemia which he found present. Gilfillen(15) recommends the use of dextrose. McCord(36) recommends 50% glucose to combat brain edema.

According to DeLee(6) Fisher first introduced to use of intravenous magnesium sulphate in 1916. This drug in combination with others has come into rather wide spread use in eclampsia. McCord(36) recommends it for both intravenous and intramuscular use, while Williams(77) and DeLee(6) advise that it be used intramuscularly. Not only does the drug promote elimination, but it also has a depressant effect.

Osman and Close(44) recommend the use of alkalies

because it is their belief that the plasma bicarbonates are low and that the administration of alkalies corrects this and promotes diuresis.

Harden(21), as previously mentioned, feels that there is a protein shortage in eclampsia and bases his treatment upon providing an adequate protein intake.

Cameron(5) thinks that there is a deficit in alkali, and that calcium is the main custodian of hepatic efficiency. His treatment consists of calcium and potassium citrate and sodium bicarbonate.

Venesection which was a part of many of the early conservative methods has fallen into disfavor except in very severe cases where a reduction of blood pressure is necessary immediately.

The above are the chief conservative methods of controlling eclampsia. The different drugs and combinations used are far too numerous to be discussed in this paper. In an analysis of all the methods given we find four basic principles: provision for normal body needs; sedation; stimulation of elimination; and reduction of cerebral edema. Most of the better treatments now provide for all of these. They also provide for good nursing care, and prevention

of accidental injury to the patient during the convulsion.

The pure conservative carries the patient on, with decreased or increased intensity of treatment as indicated, until she falls into labor and delivers spontaneously. The labor is not induced and only such obstetrical measures as would be otherwise indicated are used. While this method has shown a rather definite decrease in mortality over the purely radical method, there is still some evidence that it may cause increased morbidity and is not the ideal which medicine is trying to obtain.

#### RADICAL METHODS

The literature shows that previous to the advent of the conservative treatment the methods of treating the eclamptic patient were nothing short of barbarous. The only method of treating the eclamptic was to terminate the pregnancy as rapidly as possible. This was done by accouchment force, forceps operation, cesarean section, Duhressen's incisions, and other methods which only added more to the shock and danger to the already dangerously ill patient. Despite the terrific mortality accompanying this treat-

ment there are still some proponents of it.

The mortality figures for the radical treatment of eclampsia are quite variable. Even in the hands of such men as Pass(50) and Peckham(47) the mortality figures were excessive as compared to those obtained by conservative measures. The mortality rates commonly ranged from 40% to 50%. Some of the men advocating the radical treatment report rates considerably lower than this.

Tucker(70) expressed the reason most true radicals give for their action when he stated, that in the final analysis the causative factor of eclampsia must be conceded to be toxins arising from the products of gestation, and that therefore, the quick and complete evacuation of the uterus is the proper procedure in treatment. He goes further to say that in eclampsia there is a real emergency, and unless delivery is impending, immediate cesarean section offers the quickest relief to the mother and the best opportunity for an uninjured living baby. Out of sixteen cases of late toxemia of pregnancy, nine of which were eclamptic, treated by cesarean section his mortality was one, fetal mortality two.

Falls(14) describes a combined conservative and

radical treatment to be used in most cases, but believes that the fulminating cases which go on to convulsions a few hours after the onset of premonitory symptoms should be treated by immediate cesarean section.

Dunlap(10) expresses the opinion that cesarean section is the answer to the necessary quick delivery and relief from toxemia which is found in eclampsia. He believes this essential to the safety of both the mother and the child.

Iangroch(27) recommends section for the treatment of eclamptics, while Shand(55) takes a slightly different stand, and feels that within thirty minutes to two hours after the first convulsion the obstetrician should look for the best method to terminate the pregnancy in the individual case. It is his opinion that the induction of labor is easy in multipara, but the most eclamptics being primipara makes section often the safest and easiest way to deliver the patient.

DuBose(9) defends the use of cesarean section in eclampsia. He says that the mortality rates in some publications on eclampsia with cesarean section are misleading and that it is his opinion that eclam-



psia along with some other toxemias, placenta praevia, and pelvic disproportion are definite indications for cesarean section.

#### COMBINED TREATMENT

Thus it has been seen that the purely conservative treatment does not provide for the termination of pregnancy, while the purely radical treatment is based entirely on the immediate termination of pregnancy. Both treatments have their strict adherents, but there has come into being a combined treatment, making use of the best offered by each. It is this treatment which presents the best opportunity for the discussion of the indications and methods of termination of pregnancy. The various types of combined treatment will be discussed with no particular detail as to the medical treatment used, as it has been shown that of the leading conservative measures almost any one or combination may be used with fairly good results. The portion of the combined treatment dealing with the termination of pregnancy will be discussed in greater detail.

The American Committee on Maternal Welfare(1) has expressed an opinion which it weill be seen is

the basis for this type of treatment as described by the various authors whose work will be considered. In substance the opinion of the committee was: There are many women who, if they do not die, suffer through life the renal and vascular injuries resulting from this toxemia. The maternal death is 20% in many localities where operative measures are used. Five percent maternal mortality has been reported where the medical treatment is used primarily, especially when the medical treatment is used before the termination of pregnancy. In the interest of the mother the pregnancy should be terminated when it is found that the toxemia cannot be controlled by medical measures. Long continued toxemia is more productive of arterial and renal disease than is a more severe shorter toxemia, thus pointing to the advisability of termination of the pregnancy as soon as safe. Delivery during convulsions, or cesarean section during convulsions gives a mortality of 20% to 30%. After the convulsive manifestations are controlled the termination of pregnancy should be considered, the method of termination being considered from the obstetrical standpoint. After the control of convulsions, and if the child is viable, it is safest for both the mother

and the fetus if the pregnancy is terminated. When the period of viability is not reached, the chance of the fetus surviving is exceedingly remote and the life of the mother should not be endangered further but the pregnancy discontinued.

Deuyer(7) points out that theoretically the ideal treatment of eclampsia is the immediate emptying of uterus, and says statistics prove this is showing that from 78% to 93% of the cases cease having convulsions after delivery. He, however, uses dehydrating, eliminative and sedative measure, and attempts delivery only when the cervix is fully dilated and easy extraction without trauma is possible. He limits the use of section to primipara with long hard cervices and purely obstetrical indications.

Eden(11,12) declares that there is no increase of renal damage following the early termination of pregnancy as contrasted with the serious damage resulting when the patients are allowed to go to term. He recommends that the patient be treated with the minimum of obstetrical interference, but that is labor does not quickly occur spontaneously that it should be induced and the second stage shortened with low forceps. He considered cesarean section dangerous.

Falls(14) after a study of 500 cases of eclampsia has drawn the following conclusions: If the patient with mild toxemia does not respond favorably to conservative treatment, labor should be induced by castor oil and quinine or by bag if that fails. In some elderly primipara cesarean section may be necessary. In the rapidly advancing toxemia, eliminative treatment should be started and labor induced. In fulminating cases which go on to convulsions in a few hours after premonitory symptoms, section should be done immediately. Falls for convenience has classified into two groups those eclamptic patients in whom labor should be induced: 1. Patients who fail to respond to medical treatment, 2. Patients who entered in serious condition with a history of sudden onset of symptoms. In his series of 500 cases he reports a total fetal mortality of 66 and a total maternal mortality of two. This speaks very well for intelligent application of a combined treatment. It is the lowest maternal mortality rate for such a series found by the author, it being 0.4%.

Gordon(17) points out that if the eclamptic patient is first treated medically she will usually fall into labor and deliver. The condition according to

Falls, should be considered, in general, non-surgical.

Harrar(19) believes that to continue the pregnancy increases the danger of cardio-renal disease. He states that termination of pregnancy is therefore indicated, and that previous to viability it would seem proper to give the mother the first consideration as the fetus may frequently die in utero. In his treatment, when medical measures fail to produce progressive improvement he is more radical in termination of pregnancy, not only to save the premature infant, but to conserve the life and health of the mother.

Ingraham(29) in writing on the role of cesarean section in eclampsia expressed the opinion that the indications were only those which would exist if the patient did not have eclampsia.

Kane and Ellerson(31) in a very comprehensive study of eclampsia recommend that the second stage of labor be shortened by the use of forceps or version in those patients who were already in labor. That labor be induced in the patients not in labor appeals to them. They recommend that cesarean section be used in selected cases in primipara.

Kellogg(32) has concluded that there are two

types of eclampsia, those developing because of poor care, and those developing in spite of the best of care. He has concluded that no permanent improvement may be expected in the latter type with medical treatment, but that such improvement as can be obtained should be taken advantage of as the best time to terminate the pregnancy. It is the generally accepted opinion, he believes, that some one or other of the so called conservative methods of treating the eclamptic state, once the patient has developed convulsions or coma, gives far better results than active obstetrical intervention. Further it is generally stated that cesarean section is, next to accouchment force, the method of treatment attended by the worst results. Yet, one discovers that in most of the accepted routines, some form of interference is permitted after so many hours or days of conservative if improvement is not noted or the patient grows worse. He found that in studying a series of eclampsias treated conservatively, the method of interference was cesarean section, and was forced to conclude that this operation did have some rare use after conservative methods had failed.

According to Kellogg(32) the method of treat-

ment and the method of delivery are two entirely different things. The question of method of delivery resolves itself into adding the least possible insult to the already heavily damaged body. From a practical standpoint no delivery at all, or normal delivery when possible does the least possible mischief. How much more eclampsia a given patient will take and live, and how a given doctor views this aspect of the question is an individual matter, and no routine can be laid down that meets the requirements of all cases. Sharp individualization in method and time of delivery, without deviation from the mothers interests for those of the problematical baby is necessary. Spinal anesthesia is debatable, but local anesthesia is accepted as good. Gas and oxygen, according to this writer, with very small amounts of ether is necessary seems to do no harm.

LaVake(34) claims that to attain the greatest measure of success in prophylaxis and treatment it is essential that we visualize the course of the toxin and the probable rationale of its action, because if this is not done the severe cases will be lost by procrastination in removing the source of the toxin before irreparable damage is done. At the ac-

cession of convulsions, if the labor is not in progress, he believes in induction of labor by bag and using the modified Stroganoff treatment as an adjuvant, after the cervix is fully dilated aid the delivery, if necessary, by version or forceps. If the placenta is not delivered within an hour, he claims, it should be removed manually to get rid of the toxins it may produce.

Lee(35) emphasizes that sound medical, surgical and most important obstetrical judgement acquired only through experience and the application of obstetrical principles is necessary in the management of the eclamptic patient. He says that an eclamptic patient should not be made an emergency operative patient unless she would be that without the presence of the eclampsia. An eclamptic patient should be treated conservatively for from 6 to 12 hours, with treatment directed toward the control of the convulsions. If the fetus shows signs of distress or if the convulsions do not cease and coma deepens, preparation should be made to deliver the patient, if her condition justifies it. It is criminal, in Lee's mind, to try to deliver a fetus through a birth canal that is not prepared, and that no operation per vagina



can be safely performed without complete dilatation of the cervix, he insists. If spontaneous delivery is possible it is ideal. Low forceps are useful to shorten the second stage and episiotomy is done on the slightest provocation. Where the patient does not fall into labor spontaneously, Lee has taken up the classical cesarean section as the operation of choice having found that the bag, or rupture of the membranes to induce labor did not give the results to be desired.

McCord(36) is strongly in favor of the combined type of treatment. He has expressed the opinion that once the convulsions have been controlled, by the conservative method consisting chiefly of, morphine, magnesium sulphate and intra-venous dextrose, the pregnancy should be terminated. Because of danger to the mother he does not consider the viability of the child. His method is to terminate the pregnancy with as little trauma as possible and by whatever method is indicated by the obstetrical findings. He has come to use the induction of labor by bag or rupture of the membranes if the labor has not already begun.

McGoogan(37), as soon as the convulsions have been controlled by conservative treatment, and the

patient is improving from her eclamptic state, recommends consideration of methods of terminating the pregnancy if the patient has not already fallen into labor. The method to use must be selected with the greatest of care, and must be the method consistent with the safety of the mother. He discusses the rather poor results obtained by radical methods as compared to the conservative, and suggests that some of the poor results reported by radical methods may be due to anesthesia.

Maron(40) advocates the use of cesarean section in primipara over forty years of age, and the use of the bag in other patients who do not respond well to medical treatment. He is opposed to forcible dilatation of the cervix.

Bannister(38) claims that certain improvement without any occurrence of alarming symptoms should justify continued medical treatment. The urine output must be good and the blood pressure under 170mm of mercury. If there is no improvement under adequate medical therapy the patient should be delivered. cesarean section may be used if eliminative treatment has been used for some time, and if the patient is in reasonably good condition and the child has

a reasonable chance.

Osborne(45) has presented some material which is in part contrary to the opinions of many other writers on eclampsia. In substance his writing is as follows: As the delivery of these patients is of itself, a well recognized therapeutic procedure, this should be accomplished as soon as possible after there is evidence of elimination being accomplished by the kidneys and bowels. He has used castor oil as a purgative mostly because it frequently induces labor. In the delivery of these patients as a therapeutic procedure one must individualize, e.g. if the fetus is just to the viable stage, or if not so far developed, and the mother is responding to treatment, it might be best to let her go on under careful observation. In the case of choice of procedures for artificially terminating pregnancy in eclampsia, one must again individualize, although obstetricians quite agree, according to Osborne, that cesarean section should not be done except in the presence of extreme disproportion as many eclamptics are not at full term. He claims that bag induction carries with it a higher mortality than manual dilatation which is at all times contra-indicated. Eclamptics delivered by the

vaginal tract show the lowest maternal mortality if bag induction, manual dilitation and forceps are excluded. For those that do not labor spontaneously after castor oil purgation he advises vaginal section with version and extraction. If properly done Osborne claims this has the lowest maternal and fetal mortality rate next to spontaneous delivery. He points out that his method prevents the long time needed for bag induction, etc., and that it permits medication by the alimentary tract which is impossible shortly after the use of cesarean section. It is his opinion that if cesarean section is necessary that the low cervical is far superior to the classical because of its low mortality rate.

Pendleton(48) claims that all patients should recieve the test of eliminative treatment and an attempt to reduce blood pressure, while means of shortening or hastening the labor are considered. No patient, he says, is cured or free of danger until some time after delivery. Patients who will die unless immediate radical procedures are performed will die anyway he says. He advises rupture of the membranes in the partly dilated cervix, and gives his approval to bags in multipara, but questions their use in prim-

para. Boss dilators and accouchement force are condemned. Version should be considered in only unusual cases, and cesarean section should be used only on primipara with long hard cervices. Low forceps are considered by him to be of definite value.

Procter(51) explains that the first rule in considering surgery is to decide the operability of the patient. The eclamptic patient is in a state of shock and there is partial or complete anuria making together with other factors a poor surgical risk. He acknowledges the mortality is cut in half by the Stroganoff and Dublin treatments as compared to the surgical treatment, but suggests that there are women in whom delivery by the vaginal route will cause greater shock and trauma than if delivered by section. He explains that if we consider the pregnancy the sole cause of the toxemia, as it might be, then it would appear rational to deliver by the most rapid method. The mortality rate establishes the final test however, and is twice as great by surgery as by conservative measures. He, therefore, advises section of the low cervical type, which gives less danger of bleeding, peritonitis and subsequent rupture, for those primipara with long hard cervices, and those cases in which a long hard

delivery with great trauma is expected.

Reimberger and Schreier(52) consider the medical treatment indicated in all cases, and when it is ineffective or cervical dilatation fail they feel that at least the patient has been given properly prepared for a more favorable termination of labor. They also consider that the good results from medical treatment as compared to the relative poor results from surgical treatment may hinge upon the question of anesthesia.

Rucker(54,55) is greatly in favor of the medical treatment of eclampsia as an initial measure. He says that in the majority of cases labor sets in before or shortly after the convulsions, and that the only obstetrical measures necessary may be the application of low forceps to hasten the delivery. Delivery, in his opinion, should not be considered until the cervix is fully dilated, but also, he warns, that it is unwise to let the patient leave the hospital undelivered.

According to Shand(56) in eclampsia some method of termination of pregnancy should be looked for within two hours after the first convulsion. Induction of labor in multipara is usually simple, but of-

ten in primipara and at times in multipara the best method is cesarean section which under local anesthesia is safe for the mother and spares much trauma to the child.

Stern(59) believes in operative treatment, with the type of operation depending upon the individual case.

Tate(64) thinks it best to hurry the patient if she is in labor by the use of low forceps, but if not in labor to rely upon medical measures. Surgical intervention may, however, be needed in some cases depending upon the individual case and the skill of the operator.

Thomas et.al.(65) point out that the only reason for continuing the pregnancy in the face of a toxemia is in the interests of the child. It was hoped by these men that a careful clinical investigation and frequent function tests might permit the patient to be carried to approximately term. This was accomplished in only about 60% of the cases. The other patients either delivered prematurely or the pregnancy had to be terminated prematurely.

Tollefson(69) in a very comprehensive study of the termination of pregnancy in eclampsia has brought

out some very important points which will be summarized.

Authorities will quite agree that with pre-eclamptic toxemias which do not respond to treatment the pregnancy should be terminated. Excellent results have been reported from a large series of such cases. (Tellefson,69)

The use of cesarean section in eclampsia is generally considered inadvisable while convulsions continue; however, most authors state that occasionally fulminating cases cause abdominal section to be considered. High mortality is reported for cesarean section in eclampsia, but little is said of the mortality in vaginal operations. It must also be remembered that section frequently is a final gesture of despair, and in the treatment of the acutely ill patients it is often successful. (Tollefson,69)

Many cases of eclampsia are prevented by termination of pregnancy in pre-eclamptics, yet the use of operative procedures is said to be contra-indicated when convulsions have occurred. When then should the delivery be attempted?

The following factors in the order named are the usual accepted evidence of progress in the conservat-



ive type of therapy: Control of the convulsion; return of consciousness; increased urinary output; increased heart and lung efficiency; reduced blood pressure; decreased albuminuria; reduction of edema. These factors then, must determine whether or not the patient is responding satisfactorily to conservative measures. In general persistent coma is considered a more serious sign than the number of convulsions the patient had before they were controlled. (Tollefson,69)

The period of gestation is often one of the deciding factors for interference. The desire for a living baby sometimes causes great delay in delivery, but to delay the delivery of the mother for a probably toxic fetus seems an extremely dangerous practice. (Tollefson,69)

Parity of the patient will effect the method and time of termination in many instances. The induction of labor in the primigravida, with a long, rigid, cervix is indeed difficult, prolonged, and dangerous. Even in multiparous patients induction of labor is not always certain. A slow labor and other complications often follow bag inductions, and yet this is a favorite method in many clinics. Some suc-

cess may be obtained with castor oil, quinin, and intranasal pituitary solution. Rupturing of the membranes may suffice in others. Duhrssen's incisions and dilitation of the cervix, so often necessary, may turn out to be truly major operations.(Tollefson,69)

The following statistics are presented:

111 Spontaneous deliveries, Mort.	5.4%
46 Abdominal sections	" 12.6%
65 Vaginal operations	" 15.3%

Cesarean section statistics from four large cities gave an average mortality of 25.8% for 209 cases.

Tollefson(69), from his studies, drew the following conclusions:

1. All eclamptics may be treated conservatively for a period of time depending on their reaction to treatment. Delay in terminating patients not responding invites disaster.

2. The duration of conservative treatment should not be so long that termination of pregnancy must be done on poor surgical risks.

3. The type of procedure depends on the parity of the patient, and the condition of the cervix. Forcible delivery through the natural passages will carry an alarming mortality, possibly greater than section.

4. Termination of pregnancy in toxic patients should be done under local anesthesia, this undoubtedly being the greatest advance in years.

5. The period of gestation should not influence the decision of when to end the pregnancy, once convulsions have occurred and have been controlled.

6. A patient with eclampsia has two conditions to treat, a toxemia and a pregnancy.

Updefraff(71) claims that the pregnancy is responsible for the toxemias, and so should be terminated as soon as one convulsion has occurred. He stresses the individual method of delivery depending upon the patient, but points out that difficult forceps, forcible dilatation of the cervix, incisions of the cervix and vaginal section in his opinion have no place in the treatment. Multipara, he says, will probably have a short labor and be good prospects for conservative treatment. He admits that abdominal section is a more dangerous procedure, but uses it in some cases of uninfected primipara.

Waters(72) says that in any case once the condition has been controlled by conservative measures, it is wise to induce labor. When the cervix is partly dilated or retracted and the pelvis ample he fav-

ors the induction with a bougie or Voorhees bag. Accouchment force he feels is always contra-indicated in all cases, for if the patient's condition is so extreme as to need it, then such intervention is nearly always fatal. If the patient is a primipara with a long hard cervix, or with a borderline pelvis and a viable baby, a low-segment, transperitoneal, cesarean section, performed with spinal or local anesthesia, is best. If the patient has begun labor while in the eclamptic state, no obstetrical intervention should be attempted until she has completely recovered from the effects of the convulsive periods. The worst possible procedure and the most deadly affront to the unconscious convulsive eclamptic is a cesarean section, he claims. Next to this forcible delivery is most dangerous.

Watson(73) feels that the induction of premature labor may be indicated in cases of any type of toxemia in which the pregnancy has advanced beyond the period of viability and in which treatment has failed to control the condition. He states that eclamptics do not make good surgical risks because they are prone to infection. He, therefore, advises the use of quinine and pituitary methods before the use

of the bougie or the rupture of the membranes to induce labor. Section may be the choice in cases where a living child is greatly desired and another pregnancy is contra-indicated. The one exception Watson makes to this is the fulminating type of eclampsia where cesarean section may save the life of the child and according to him does not increase the danger to the mother. In general, however, he prefers the induction of labor to section, reserving the later for cases in which there is some obstetrical indication.

Watson(74) advises that delay in termination may lessen the patients chances and advises that the uter-  
be emptied as quickly as possible with consideration to the patients condition and well-being. He advises mechanical dilitation of the cervix as a good method of rapid delivery, but frowns upon cesarean section.

Williams(75) is wholly in favor of the termination of pregnancy as a prophylactic measure. For the eclamptic he prefers the modified Stroganoff treatment and says that theoretically fewer deaths would occur if delivery could be affected at the proper time. The question then remained when and how to terminate the pregnancy. He suggests first that there be no general anesthetic used and that cesarean adds

to the danger of the mother and should be avoided. He points out the fact that improvement from the medical treatment is temporary, and that, following this temporary improvement, the symptoms once more increase in severity and become so threatening as to demand induction of labor. This, however, he claims to be no so serious as it enables one to cope with the condition by a relatively simple procedure during the time of improvement, rather than resorting to radical operative intervention with its dangers while the patient is in such a dangerous convulsive state.

Williams(77) stresses very strongly the use of the conservative measures, and then concludes by saying that if the patient does not go into labor as most convulsive patients will, or if her labor does not seem to be progressing normally, it may often be simple to rupture the membranes. Abdominal delivery, according to him should be reserved for those instances in which there is some indication for cesarean other than eclampsia.

#### SUMMARY

So long as the etiology of eclampsia shall remain unknown the treatment of the disease must remain

empirical and rather unsatisfactory. Prophylactic treatment is pretty well standardized. Cases which are mild according to Eden's classification and which improve under medical treatment may be allowed to continue pregnancy under careful observation. The cases which according to Eden are severe, or the mild cases which do not improve should be terminated, by induction if this appears easy, or by cesarean section if vaginal delivery will prove difficult.

The various types of treatment all have their good and bad features. The conservative outlook, for the most part, is one which overlooks the hypothesis that the products of gestation are probably the source of the toxins, yet the mortality figures for the conservative methods are greatly in their favor. The radicals defend their methods by showing that most convulsions cease after delivery, that if the pregnancy is continued the maternal mortality and morbidity increases, and that the prognosis for the child is questionable and so the mother should be given the benefit of delivery. The combined treatment seems to offer the best to be had in treatment of the eclamptic. Each case by this method is handled more or less individually, medical treatment is given

until the patient is improved, and then if the patient is not already in labor, as most of them will be, the method of delivery which will cause the least shock and trauma to the mother is undertaken. The safety of the mother is placed above the safety of the fetus.

Indications for termination of pregnancy in the eclamptic vary with the different authors and with the individual cases. As prophylactic treatment the termination is accepted in severe cases, or mild cases which do not respond to treatment. Obstetrical intervention is generally considered contra-indicated in patients in convulsions or coma, although in the severe fulminating cases cesarean section may save the life of the mother who almost certainly will die anyway. It is pointed out that the improvement under medical treatment is only temporary. Advantage should be taken of this temporary improvement to terminate the pregnancy, as this decreases the danger of more damage to the mother.

Methods of terminating the pregnancy are considered for the most part to depend upon the obstetrical indications aside from the eclampsia. In prophylaxis induction of labor is often difficult, and in proper hands cesarean section gives good results. If the



patient is already in labor when the convulsions are controlled it becomes a problem to decide what method of delivery will give the least trauma. Rupture of the membranes, the insertion of a bag if the cervix is not fully dilated, the use of low forceps and episiotomy are generally accepted procedures for shortening the labor. The use of manual dilatation, Dührssen's incisions, version and high forceps are generally frowned upon for shortening they labor, as they produce considerable trauma and shock. They should be used only when obstetrically indicated. If the patient has a fulminating toxemia, then and then only does it become proper to intervene during convulsions, then cesarean section seems the most method and a method which may save a few lives that might otherwise be lost. If the patient recovers from the convulsions and improves under the medical treatment it is best to delivery her by the vaginal route if this appears rather easy. The labor may be induced by quinine, castor oil, pituitrin, bags, or rupture of the membranes. There seems to be little indication for any mutilative vaginal operative procedure, if the labor progresses normally low forceps may be used to shorten the second stage. Other methods should

be reserved for obstetrical indications. If the patient is a primipara with a long, hard cervix, most authorities advise cesarean section as the simplest and safest method of delivery, however, some are in favor of the rather uncommon vaginal section. The use of accouchment force, and other mutilating operations is to be avoided. Cesarean section, vaginal section, version, manual dilatation, Durhssen's incisions and high forceps are always to be avoided except in very unusual cases presenting some absolute obstetrical indications. General anesthesia of any type is to be avoided. Spinal anesthesia is acceptable and local anesthesia is preferred.

#### CONCLUSIONS

Indications for termination of pregnancy in eclampsia:

1. As a prophylactic measure if toxemia is severe or not controlled by medical measures.
2. After the convulsions have been controlled and the patient temporarily improved by medical measures.
3. In fulminating cases immediate termination is indicated.

Methods for termination of pregnancy in eclampsia:

1. Induction of labor by some sensible method and use of low forceps for most cases.
2. Cesarean section to be used in: primipara with long hard cervices; in fulminating cases; as method of choice in prophylactic treatment.
3. Other operative measures to be used where obstetrical indications exist.
4. In general use method which will cause least trauma and give fairly rapid delivery.
5. Use only spinal or local anesthesia.

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