THE MATERNAL MORTALITY IN THE FIRST 5000 OBSTETRICAL CASES AT THE JOHNS HOPKINS HOSPITAL.

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The advance of medical science in modern times is apparent to everyone who pays even slight attention to the current publications, but that this knowledge can be applied so as to be a more efficacious means of preventing death is sometimes doubted. It must be granted that a great part of the contributions to medical literature, whether from the laboratory or the clinic, have no immediate practical value. Nevertheless, every fact which is added to our knowledge of the body or to a better acquaintance with the varied influence of our environment upon health, will ultimately increase the practitioner's ability to combat sickness and death. The art of medicine will sooner or later follow every progressive step taken by the science of medicine.

However, we are not dependent upon theoretical considerations for our confidence in the present-day improvement in medical practice. In obstetrics the improved results are most strikingly manifested in connection with puerperal infection. Only a little more than fifty years have elapsed since death from this cause alone occurred in ten out of every hundred women delivered in the large European hospitals while at

present the maternal mortality from this cause has been reduced to between 1/5 and 1/10 of one per cent in many well conducted Lying-in Institutions.

At the suggestion of Dr. Williams I have reviewed the records of the first 5000 cases in the Obstetrical Department of the Johns Hopkins Hospital for the purpose of determining the maternal mortality, as well as the relative seriousness of the various complications which occurred in this series of cases.

It should be understood that the temptation "to correct" our statistics has been avoided. Every death occuring in the service for the period covered by the statistics has been included, although in some instances the fatality was attributable to intercurrent affections and in no wise to the obstetrical condition of the patient. These number 55, and in consequence the total maternal mortality for the series is 1.1 per cent. For the sake of completeness, I append abstracts of the fatal cases at the end of the article.

The Obstetrical Department of the Johns Hopkins Hospital embraces two services; namely, the Outpatient Service, in which the patients are attended at their homes, and the House Service, comprising the cases which are treated in the hospital. The first is somewhat larger, so that my statistics include 2750 out-door and 2250 house patients. Whenever possible, abnormal or complicated cases occurring in the outside service are brought into the hospital. This explains the preponderance of fatalities among the hospital cases, among whom 48 out of the 55 deaths occurred.

Of the 5000 cases, there were 4631 (92.62 per cent) delivered at term, while 369 (7.38 per cent) failed to progress so far; roughly speaking, a proportion of twelve to one. On the other hand, when the 55 fatal cases are considered from the same point of view, we find that the number of maternal deaths after the delivery of mature children is actually only three times greater than that obtaining among the comparatively small number of women who had not advanced to term. Thus, there were 41 deaths, or 74.54% of all fatalities, in women delivered at term; 12 deaths, or 21.81% of all fatalities, in women delivered prematurely; 2 deaths, or 3.64% of all fatalities, in women undelivered and premature.

In other words, there was a mortality of 0.89% in the former as compared with one of 3.79% in the latter group.

The significant difference between a mortality of 0.89% after delivery at term and 3.79% after premature delivery may be in great part accounted for by the more frequent occurrence of infection in cases of abortion, a point which can be discussed more appropriately in a later paragraph. Yet, in addition to this, it must be remembered that toxæmias, as well as excessive bleeding in pregnancy due to placental abnormalities, occasion in themselves, or through the operative measures which they necessitate, a number of fatalities before the completion of full term.

For further study of our 55 fatal cases it is convenient to classify them according to the cause of death. This is not altogether satisfactory, since in certain instances more than one serious condition was present and consequently it is difficult to determine which of them played the greater part in the production of the fatal issue. Thus, in some of the eclamptic cases virulent infections were also noted, and in others cervical lacerations of an extreme degree, either of which may have superseded the toxæmia as the actual cause of death. On the whole, however, it is most satisfactory to divide the cases as follows:

Group I. Infections.
" II. Toxæmias.
" III. Hæmorrhages.
" IV. All others.

GROUP I. INFECTIONS.

We find here the most frequent cause of death, the group including 21 cases, or 38.18% of the entire series. From this it follows that in the 5000 cases the gross mortality from infections was 0.42%.

Of the twenty-one patients, sixteen died in the hospital and five in their homes while being cared for by the Outpatient Service; nine being operative, and six spontaneous full term deliveries, together with six abortions. One case of pyelitis is included in this group in which a spontaneous miscarriage occurred. The autopsy revealed a general pyæmia. While the death was not due to puerperal infection strictly speaking, it is most conveniently grouped here.

The relation of operative procedures to obstetrical infection, as illustrated by these statistics, is instructive. Of the 5000 cases under consideration, 655 were operative, a percentage of 13.1, with a mortality from infection of 1.37%; as compared with 0.1% in the patients who were delivered spontaneously at term. The nine fatally infected operative cases include:

Symphyseotomy (the only one in the series)	1
Craniotomy on dead child (infected before seen)	2
Cæsarean section (pelvic dystocia)	2
Manual removal of placenta	2
Forceps and removal of placenta	1
Accouchement forcé (eclampsia)	1

As far as could be determined from the clinical history and the autopsy findings, the cause of death in the foregoing nine cases was peritonitis in six, pyæmia in four, pulmonary embolism in one, and endocarditis in one.

A word of comment is merited by the relatively frequent history of abortion among the fatal cases of infection, almost one-third of the infections having followed this condition. In each of the six instances the patient was already infected on admission to the service, as was demonstrated by the routine intra-uterine culture, which is taken in all suspected cases before any treatment is instituted. It is not unlikely that most or all of the abortions were the result of criminal procedures, undertaken without regard to aseptic precautions; as the experience in this clinic with therapeutic abortions, indicates that the latter operation, if properly performed, is not attended by any greater risk of infection than in delivery at term.

The responsibility for the 21 fatal infections in our statistics may be fairly placed as follows. In twelve instances positive evidence of infection was present when the patients were first seen by a member of the department. In another case the patient admitted having had coitus at the onset of labor, sixteen hours before the birth of the child, and the infection seemed to be definitely attributable to the former event, since no vaginal examinations were made during labor. In two other instances it is impossible to fix the responsibility for the infection, since the patients had been examined by individuals with defective technique before they were sent to the hospital. In the remaining six cases the department is wholly responsible for the development of the infection—one-eighth of one per cent.

The instances in which the department had exclusive care of the patients included—

(a) *One Symphyseotomy.*—Here the incision became infected and subsequently the pelvic veins. Death occurred suddenly on the ninth day of the puerperium. A pulmonary embolus was suspected clinically, but could not be demonstrated at autopsy.

(b) *Two Cæsarean Sections.*—The first of these was performed in the patient's home amid very dirty surroundings. Infection of the abdominal incision resulted in a fatal general pyæmia. The second patient was operated upon at the hospital, after a single vaginal examination. Laparotomy was done after the patient had been in the second stage of labor between two and three hours, when the temperature was above normal and the pulse rapid. Symptoms of peritonitis developed on the third day, and death resulted from an intestinal obstruction.

(c) *One case* from which the *placenta* was *removed manually* died from infection with *B. ærogenes capsulatus.*

(d) *Two cases delivered spontaneously* in the Outpatient Service died of septicæmia. Each was examined by vagina twice.

The first of the two cases, in which it is unlikely that infection occurred at the hands of the department, had been under the care of a midwife for some hours previous to entering the hospital. She was ultimately delivered by accouchement forcé. Death occurred on the eleventh day of the puerperium. The second patient, likewise, had been examined vaginally by a midwife without due regard to cleanliness. She was delivered by an easy low forceps operation, after which it was necessary to remove the placenta manually.

An analysis of the bacteriological findings in the various cases showed that the infecting micro-organism was in seven cases pure streptococcus; in one case a streptococcus and *B. coli communis;* in one case a streptococcus, *M. gonorrhœæ* and *B. ærogenes capsulatus;* in one case a streptococcus and *B. ærogenes capsulatus,* and in two cases *B. ærogenes capsulatus* alone. In one patient admitted on the twenty-third day of the puerperium, the uterine culture was sterile, but the patient died the following day of ulcerative endocarditis. In eight cases I was unable to obtain any record of the bacteria concerned.

Group II. Toxæmias.

The more thorough appreciation of the importance of asepsis at the time of delivery has so reduced the mortality from puerperal infection that it is at present only a slightly more important cause of death in obstetrical practice than metabolic disturbances. In the 5000 cases under consideration there were 16 deaths from the various toxæmias of pregnancy—more than one-fourth of the total number. These can be best considered according to their pathology, and include fatalities from eclampsia, nephritis and toxæmic vomiting.

Eclampsia was the most frequent form of toxæmia met with in this series. The 12 cases under this head represent a total mortality of 0.24%, and constitute 22% of all the fatal cases.

During the period covered by these statistics there were 48 cases of eclampsia treated by the department, which may be classified as follows: Antepartum, 27 cases (56.25%); intrapartum, 7 cases (14.58%); postpartum, 14 cases (29.17%); total, 48; with 8, 2, and 2 deaths in the several groups, respectively. Therefore, the mortality in this clinic from the disease in question is 25%. Its varying seriousness in each group is represented by a percentage of 29.63, 28.57, and 14.29, respectively.

One-half of the fatalities from eclampsia occurred within 12 hours after admission to the hospital and the patients were in extremis at that time. With the remaining six, death occurred in two after 18 hours, in one after 36 hours, and in the others on the 4th, 7th and 8th days. Case No. 571, in which death was clearly due to puerperal infection on the 11th day is not fairly included among the fatal cases of eclampsia.

In two of the fatal cases (Nos. 909 and 1722) the diagnosis rested entirely upon the autopsy findings. Clinically, they escaped recognition, since convulsions were entirely absent during the course of the disease. The pathological picture in each, however, was that characteristic of eclampsia. These cases have recently been described in detail by Slemons in his article upon eclampsia without convulsions.

Nephritis.—It is generally conceded that nephritis may give rise to intoxications during pregnancy independent of its association with eclampsia. Two such cases terminated fatally in this clinic. In one the post-mortem findings clearly demonstrated the nature of the toxæmia; while in the other, although no autopsy was allowed, the history and the clinical picture would permit no other diagnosis.

The first of these (Case No. 9) could not have been distinguished from eclampsia clinically. The well-known premonitory symptoms had been observed. A convulsion occurred during labor and was followed by coma. The patient partially recovered from this, but remained semi-conscious for a number of days, and died one month after delivery. At the autopsy no lesions were found in the liver, but the kidneys were the seat of marked interstitial changes, demonstrating a chronic nephritis as the cause of her toxæmia.

The other patient (Case No. 198) presented symptoms of threatened eclampsia, such as headache and albuminuria with

casts. She was delivered on account of the evidences of a profound toxæmia, but failed to improve subsequently. Death occurred on the 18th day of the puerperium, the patient having been in a semi-stupor most of the time since delivery. Although an autopsy was not permitted, the marked clinical similarity with the case just cited indicates that the two should be classed together.

TOXÆMIC VOMITING.—Two fatal cases of vomiting of pregnancy appear in this series and bear a striking clinical resemblance to each other. In each instance the uterus was emptied in the third month of pregnancy, and in each death occurred at the end of 48 hours.

Case No. 650 occurred before the association of a central liver necrosis with these cases had been pointed out. The autopsy note only states that fatty degeneration was present and makes no comment on its localization. Case No. 2116, which is described in detail in Dr. Williams' Monograph upon vomiting of pregnancy, exhibited clinically a very high percentage of nitrogen eliminated as ammonia, but unfortunately an autopsy was not allowed. -

GROUP III. HÆMORRHAGE.

There were eight deaths in the 5000 cases attributable to excessive loss of blood, a mortality of 0.16%. Viewed from the total number of deaths in the series, of which they constitute 14.54%, these fatalities demonstrate the importance of hæmorrhage as a cause of death in obstetrical practice. The figures show it to rank third in this connection, being preceded only by infection and toxæmia.

The anatomical basis for the excessive loss of blood was most frequently placenta prævia, which was present in precisely one-half of the cases that died from hæmorrhage. This abnormality was observed in 13 of the 5000 cases, a mortality of 30.8%.

The great danger of death from hæmorrhage in placenta prævia depends primarily upon the location of the placenta, and this in itself may give rise to such an acute loss of blood as to cost the patient her life before treatment can be instituted. Thus, in two of our cases the exsanguination was so extreme on admission to the hospital that death was practically simultaneous with their entrance into the ward. Similarly in the third case, although the patient lived for two hours after admission, death could be ascribed only to the profound anæmia occasioned by the bleeding before and during delivery, and was not attributable to traumatism of the birth canal.

It is important to remember, however, that in many cases of placenta prævia death may result from complications incident to its treatment, and of these none is more potent than deep lacerations of the cervix and lower uterine segment. This is illustrated in our fourth case, in which the sequence of events was as follows. The patient was sent into the hospital at the eighth month of pregnancy with a history of bleeding. While a vaginal examination was being made to determine its cause, a profuse hæmorrhage resulted from the introduction of one finger into the cervical canal, which was found to be dilated to approximately 2 cm. with the internal os entirely covered by the placenta. It, therefore, seemed expedient to deliver the patient at once and accordingly the cervix was dilated manually without the least difficulty, the placenta perforated and the child extracted by the breech. There was only a normal loss of blood after the completion of delivery, but two hours later the patient suddenly collapsed and died before any treatment could be instituted. The autopsy disclosed a relatively slight laceration of the cervix, and a large subperitoneal hæmatoma resulting from an incomplete rupture of the lower uterine segment which involved one of the branches of the uterine artery.

It is probable that a better result would have been obtained by the use of a slower method for dilating the cervix; and in this clinic experience has led to the use of the Champetier de Ribes' balloon in such cases whenever possible. As the cervix is usually softened and sometimes partially dilated in this class of cases, rapid manual dilatation might appear to be the operation of choice, except for the fact that the consistence of the cervix under these circumstances renders it more liable to deep laceration than usual. Accouchement forcé should be avoided whenever possible.

The danger of this procedure is likewise demonstrated in another of our deaths from hæmorrhage. This occurred in a patient suffering from chronic nephritis who was delivered by accouchement forcé. Following the operation a cervical laceration was noted and repaired, and the uterus and vagina were packed with sterile gauze. The patient left the operating room in good condition, but died very suddenly four hours later, with some external hæmorrhage and a large subperitoneal hæmatoma.

In one instance (Case No. 2201) death from hæmorrhage was associated with complete rupture of the uterus. The patient was admitted in a state of shock, prolonged attempts at extraction of the child having been made before the physicians in attendance decided to send the case into the hospital. On examination it was found that the child had been expelled into the abdominal cavity, with the exception of the feet and legs, which remained within the lower uterine segment. Tentative, but unsuccessful, traction was made upon the most accessible lower extremity in order to determine the possibility of delivering the child through the rent in the lower uterine segment, and the patient died before a laparotomy could be performed.

Case No. 1548 died from hæmorrhage in the course of a Cæsarean section, rendered necessary by a contracted pelvis. As the previous labor had been terminated by Cæsarean section, a hysterectomy was determined upon on this occasion. Profuse bleeding had occurred during the delivery of the child and continued. Following the amputation of the uterus there was such unusual hæmorrhage from the cervical stump that death occurred before it could be controlled.

Fatal hæmorrhage on the fourth day of the puerperium occurred in Case No. 1370 of the Outpatient Service, which

was reported by Bettman. The autopsy showed an incomplete rupture of the lower uterine segment which had been brought about by the impaction in the pelvic cavity of the hypertrophied non-pregnant horn of a bicornuate uterus.

Group IV. All Other Causes.

It is necessary to place together in a miscellaneous group 10 of the 55 fatal cases in this series, since they do not readily fall into either of the previous groups. The fatal complications in this division are frequently not strictly obstetrical, yet they are purposely included in this list, as it is desired to account for every death in the 5000 cases.

Intestinal obstruction has been found at operation or autopsy in three cases without any other obvious cause of death. In two instances it represented a postoperative complication of Cæsarean section. Case No. 1256 died on the third day after an enterostomy had been performed. At the operation there was no sign of peritonitis and the high degree of intestinal distension could be accounted for only by a blocking of the gut by unusual numbers of round worms. In Case No. 2158, likewise a Cæsarean section, the obstruction was due to adherence of a loop of the small intestine to the abdominal incision. The adhesions were freed at a secondary operation, but death ensued.

The third instance of intestinal obstruction occurred independently of a previous laparotomy. This patient was delivered per vias naturales and the morning after the operation was apparently in good condition. During the day marked abdominal distension developed, the pulse became very rapid and respiration labored. Death occurred suddenly 28 hours after delivery. The clinical diagnosis was "cardiac failure," but the autopsy revealed definite intestinal obstruction. At the left cornu of the uterus the gut was firmly held by an old adhesion. The change in size of the uterus consequent upon the termination of labor had brought about a kink in the gut and an obliteration of its lumen. The unusual distension of the abdomen compressed the thorax, thus accounting for the labored respiration and probably explaining the sudden cessation of the heart beat, since a myocarditis was present.

Intercurrent Medical Diseases were accountable for three deaths.

Typhoid fever developed in one patient about two weeks before term. She was delivered spontaneously after a very short labor, but slowly became worse and died on the twenty-first day of the puerperium. Typical lesions were found at autopsy.

Pneumonia complicated with chronic heart disease caused the death of another woman at the eighth month of pregnancy. Labor had not supervened and she died within 24 hours after entering the hospital.

The third death from a purely medical complication occurred in a woman at the fifth month of pregnancy, suffering from amœbic dysentery. She fell into labor and was delivered spontaneously. Death occurred two days later.

Thrombosis of the left common iliac vein occurred in one patient who had worn a tight bandage about her abdomen throughout pregnancy for the purpose of concealing her condition. The binder had also been effective in producing intestinal paralysis and thrombosis of the left common iliac vein. She was admitted to the ward with unmistakable signs of obstruction. On this account labor was induced and death followed 12 hours after delivery. At autopsy an embolism was sought for, but none could be found. I reported this case in detail in the Bulletin of the Johns Hopkins Hospital for June, 1904.

Embolism of the pulmonary artery was the cause of death in Case No. 962. This patient was delivered by low forceps. Shortly after the completion of labor her temperature was 101.2°, but quickly fell to normal and subsequently did not rise above 100.4°. No abnormality was noted in the puerperium until the 12th day, when the patient suddenly complained of pain in her chest and difficulty in breathing while the breasts were being massaged. Death occurred two hours later. The autopsy revealed a cystitis associated with thrombosed veins in the pelvis, which had been the source of the embolus which had lodged in the pulmonary artery.

Exophthalmic Goitre was the only apparent cause of death in Case No. 2181. The patient was at term and probably in labor on admission to the hospital, although she complained only of dyspnœa. About six hours later pains began and the child was born within an hour. Immediately after its expulsion she collapsed and did not rally.

Anæsthesia would seem to be accountable for but a single death in the 5000 cases, and in this instance ether was employed. The patient was a very fat woman, weighing more than 300 pounds. Operative interference was rendered necessary by the impaction of a breech presentation and death occurred during the extraction of the child. At autopsy no pathological lesion was demonstrable.

Ether was administered on account of the corpulence of the patient, as it was believed that it would be safer under the prevailing circumstances than chloroform which is used in this clinic almost without exception.

It is indeed notable that we have had no fatality from chloroform in these 5000 cases, although it is given as a matter of routine to every patient at the end of the second stage of labor and to the point of complete anæsthesia when the vulva is fully distended. Moreover it is employed in all operative deliveries, except occasionally in certain cases of Cæsarean section. Its relative safety in obstetrical practice is too well known to need more extended comment, although the endorsement afforded by this series of cases very well merits mention.

ABSTRACT OF HISTORIES.

Group I. Infections—21 Cases.

1. *House No. 261.* Symphysiotomy for contracted pelvis. Infection of incision and pelvic veins. Patient died suddenly a few minutes after dressing the vaginal wound, apparently of embolism, but this was not found at autopsy. *Autopsy No. 1139.* Necrosis and gangrene of wound. Extravasation of blood in pelvic fascia. Acute splenic tumor. Hypostatic congestion of lungs.

2. *House No. 372.* Patient admitted in consequence of a neglected brow presentation, having been under the care of a midwife and doctors who had attempted delivery. Examination showed a prolapsed cord and dead child. Delivery by craniotomy. Cultures taken at the time of operation showed pure streptococcus. Patient developed vesico-vaginal fistula, phlegmasia alba dolens, and ran a typical course of infection. She died suddenly of pulmonary embolism on the 27th day of the puerperium after the vaginal wound had been dressed. *Autopsy No. 1304.* Vesico-vaginal fistula resulting from pressure necrosis during labor. Pseudomembranous endometritis. White thrombosis of vesical veins, internal and common iliac veins, and of vena cava. Emboli in right pulmonary artery and pulmonary trunk, projecting into left pulmonary artery. Perforation of uterus. Localized peritonitis.

3. *House No. 571.* Eclampsia at six months. The patient had been examined several times before admission by a midwife and doctors. Cervical dilatation was begun by Champetier de Ribes balloon and completed by the Harris manual method. Patient ran a typical course of infection and died on the 11th day. *Autopsy No. 1484.* Endo- and parametritis. Septicæmia. Metastatic lung abscesses.

4. *House No. 582.* Patient admitted on the 23d day of the puerperium. Died the following day of ulcerative endocarditis. *Autopsy No. 1487.* Acute vegetative and ulcerative endocarditis, aortic, tricupsid, and pulmonary valves.

5. *House No. 921.* Patient was admitted when six months' pregnant. Had been sick with chills and fever for two weeks before admission. Had miscarriage several days after admission. Manual removal of placenta. Died three days later. *Autopsy No. 1763.* Pyonephrosis. Multiple pyæmic abscesses. General infection.

6. *House No. 1300.* Spontaneous delivery 11 days before admission. Attended by midwife. Death three days after admission from septicæmia. No autopsy.

7. *House No. 1311.* Patient admitted with infected abortion. Uterus cleaned out. Died on the 10th day of puerperium of peritonitis. *Autopsy No. 2024.* Abscess of left ovary. General fibro-purulent peritonitis. Fibro-purulent pleuritis, right. Metastatic abscesses in lung.

8. *House No. 1373.* Spontaneous delivery six days before admission. Attended by an outside doctor. Patient had general peritonitis on admission and died three days later. Laparotomy and enterostomy for distension. No autopsy.

9. *House No. 1531.* Patient admitted with infected abortion. Temperature became normal in about six days. Convalescence uneventful. On examination on the 16th day was found to be in good condition, but for small pelvic mass. Discharged. Returned two days later with general peritonitis. Operated upon, but died next day. No autopsy.

10. *House No. 1611.* Cæsarean section for contracted pelvis. Examined once. Symptoms of peritonitis developed on the third day, which were clearing up, when patient developed intestinal obstruction and died. *Autopsy No. 2209.* Infection of uterine wall with necrosis and abscess formation. General peritonitis.

11. *House No. 1700.* Delivered by the outpatient department. Two examinations with the usual technique. Child born half an hour after examinations. Three days later patient developed chills and fever. Died on the 16th day of the puerperium. *Autopsy No. 2236.* Puerperal infection of uterus. Infected thrombus of left ovarian vein. Localized peritonitis. Purulent arthritis of knees.

12. *House No. 1702.* Admitted with infected incomplete abortion. Died on the 18th day of pyæmia. *Autopsy No. 2260.* Thrombosis of vena cava, left common iliac vein, external and internal iliac, femoral and saphenous veins. Partial thrombosis of right common iliac vein. Embolic abscess in lung.

13. *House No. 1765.* Spontaneous delivery, attended by midwife. Admitted on the 15th day of puerperium for general septicæmia. Died next day. No autopsy.

14. *House No. 2052.* Patient was delivered by the outpatient department, but was not examined vaginally. Had had coitus at the onset of labor 16 hours before delivery. Developed infection and died of general peritonitis on the seventh day of the puerperium. *Autopsy No. 2457.* Infected puerperal uterus with multiple abscesses and gangrene of uterine wall. Acute fibro-purulent peritonitis.

15. *House No. 2103.* Admitted 12 days after an abortion. Septicæmia. Died six days later. No autopsy.

16. *House No. 2212.* Miscarriage. Manual removal of placenta by midwife. Admitted several days later for general peritonitis. Died 24 hours after admission. *Autopsy No. 2564.* Acute fibro-purulent peritonitis.

17. *Outpatient Department No. 56.* Physometra when seen. Delivered by craniotomy. Died on the third day from an infection with *B. œrogenes capsulatus* and streptococcus. No autopsy.

18. *Outpatient Department No. 210.* Patient had been examined several times by a midwife before department was called. Delivered by low forceps. Manual removal of placenta. Rupture of bicornute uterus. Patient refused to come to hospital for operation and died of peritonitis. *Autopsy.* General peritonitis and rupture of bicornute uterus.

19. *Outpatient Department No. 1221.* Spontaneous labor. Two examinations with the usual technique. Normal puerperium until the fifth day, when the temperature suddenly rose to 105° and the patient died 12 hours later. No autopsy.

20. *Outpatient Department No. 1574.* Child delivered normally. Manual removal of placenta. Patient died on the fourth day. Infection with *B. œrogenes capsulatus.* No autopsy.

21. *Outpatient Department No. 935.* Patient delivered by Cæsarean section in her home amid extremely dirty surroundings. The incision became infected and the patient died of pyæmia. No autopsy.

GROUP II. TOXÆMIAS—16 CASES.

(A) *Eclampsia—12 Cases.*

1. *House No. 27.* Patient admitted in deep coma, after having had 11 convulsions. The convulsions continued for 24 hours after delivery; the patient remained in deep coma and died on the fifth day. *Autopsy No. 912.* Acute and chronic nephritis. Acute degeneration, necroses and hæmorrhages in liver.

2. *House No. 322.* Patient had slight premonitory symptoms of eclampsia. Easy and spontaneous labor. First convulsion three hours after delivery. Seven convulsions in 18 hours. She then improved somewhat, but later passed into a semicomatose condition and died on the eighth day of the puerperium. *Autopsy No. 1218.* Acute parenchymatous nephritis. Multiple foci of necrosis in liver. Œdema of lungs.

3. *House No. 496.* Admitted with symptoms suggesting toxæmia of pregnancy. She was put upon treatment and the condition improved. Patient awakened one night complaining of intense headache. Shortly afterwards she had a convulsion. Delivery by accouchement forcé. Condition improved for several days, then began to grow worse. She passed into a semicomatose condition and died on the seventh day. No autopsy.

4. *House No. 787.* Eclampsia gravidarum. The patient had had several convulsions and was in deep coma on admission. Accouchement forcé. There were no convulsions after delivery, but the deep coma continued and death occurred eight hours after admission. *Autopsy No. 1637.* Acute nephritis, with fatty degeneration. Focal necrosis in liver about portal spaces. General œdema.

5. *House No. 795.* Profoundly comatose patient admitted in labor, with a history of having had three convulsions. She was delivered at once, but remained in coma and died six hours later. No autopsy.

6. *House No. 909.* Patient delivered spontaneously by the outpatient department, and had "several fits." She was seen at once and found to be in deep coma. She was brought to the hospital, but failed to regain consciousness or to respond to treatment and died two hours later. *Autopsy No. 1749.* Chronic nephritis. Hæmorrhages into the liver. Œdema of lungs.

7. *House No. 1176.* Eclampsia gravidarum. The patient had had two convulsions and was in deep coma on admission. She was delivered immediately. The convulsions continued throughout the night, followed by coma. Patient died 11 hours after admission. *Autopsy No. 1921.* Cloudy swelling of kidneys. Focal necrosis and hæmorrhage in liver. Œdema of lungs. Bronchitis and bronchopneumonia.

8. *House No. 1177.* The patient had slight symptoms of toxæmia on admission, but these cleared up under treatment and there were no further symptoms. During the second stage of labor a single convulsion occurred, followed by deep coma. Death in four hours. *Autopsy No. 1934.* Slight chronic interstitial nephritis and parenchymatous degeneration of liver. General anæmia.

9. *House No. 1243.* Eclampsia gravidarum. Patient admitted in deep coma, after having had four convulsions and having been delivered. She had four convulsions after admission, remained in deep coma, and died in 36 hours. No autopsy.

10. *House No. 1625.* Eclampsia gravidarum. The patient had had 11 convulsions, and was in deep coma when seen. She died three hours after admission. No autopsy.

11. *House No. 1722.* Patient admitted in deep coma at the eighth month of pregnancy, with the history of headache and œdema of legs. A few hours before admission she complained of severe headache and a few minutes later went into coma. There were no convulsions. This is a case of eclampsia without convulsions. *Autopsy No. 2265.* Pregnancy eight months. General œdema. Slight parenchymatous nephritis. Focal necroses and hæmorrhages in liver.

12. *Outpatient Department No. 442.* The patient was seen in deep coma by the outpatient department four hours after the child was born. There had been many convulsions before delivery. The family was urged to allow the patient to be taken to the hospital, but they refused. The patient then had several slight convulsions, remained in coma, and died 16 hours later. No autopsy.

(B) *Nephritis—2 Cases.*

1. *House No. 9.* Admitted in semicomatose condition. Urine showed traces of albumin, hyaline, and granular casts. On treatment, condition improved somewhat. Labor set in on the eighth day after admission. Second stage ended with forceps on account of uræmic symptoms. Patient remained in semicomatose condition and was taken home on the 32d day of the puerperium. Died 12 hours later. *Autopsy No. 483.* Chronic diffuse nephritis. Slight fatty degeneration of liver. No peripheral necrosis in liver.

2. *House No. 198.* Patient admitted with intense headache. This continued and patient seemed irrational at times. Delivery by accouchement forcé. Patient gradually became semiconscious and died 18th day after admission without convulsions. This is classed as a case of chronic nephritis. No autopsy.

(C) *Vomiting—2 Cases.*

1. *House No. 650.* Patient had been vomiting incessantly for three weeks before admission. Was then three months' pregnant. On admission her condition was bad. Pulse 120 to minute, general condition poor. Therapeutic abortion was done. The next day she became delirious and later went into coma. She died 48 hours after the uterus was emptied. *Autopsy No. 1551.* Fatty liver. Endometritis and puerperal uterus.

2. *House No. 2116.* Pernicious vomiting. The patient began to vomit when six weeks' pregnant and had been vomiting almost constantly for one month. High ammonia coefficient. Therapeutic abortion was done, but the patient continued to vomit and died two days later. No autopsy.

Group III. Hæmorrhage—8 Cases.

1. *House No. 460.* Patient was admitted with a history of having had profuse hæmorrhage the day before from placenta prævia. Her condition was extremely poor. Pulse varied from 150 to 170. Was delivered at once, with very little additional hæmorrhage, but died at the end of the operation. *Autopsy No. 1389.* Slight tear of cervix. Anæmia of viscera.

2. *House No. 694.* The patient had been in labor for over two days before admission. Numerous attempts made to deliver her, but these were unsuccessful, because of the generally contracted rachitic pelvis. There had been considerable bleeding from a lateral placenta prævia. Condition poor, pulse 150 and of poor quality. Examination showed a prolapsed cord and a dead child. Craniotomy. The patient did not bleed during the operation, but died a few minutes later. No autopsy.

3. *House No. 866.* Patient had been bleeding for 24 hours before being seen. The blood had soaked through the mattress and 700 or 800 cc. of clots were in the bed. She was brought at once to the hospital, in very poor condition, and delivered. There was very little hæmorrhage afterwards, but she failed to respond to stimulants and died several hours after admission. *Autopsy No. 1715.* Cervical laceration. Anæmia of all organs.

4. *House No. 1126.* Patient suffering from toxæmia. Delivered by accouchement forcé. She lost a large amount of blood during the operation, had a deep cervical tear and incomplete rupture of the uterus. This was sewed up and the uterus packed with gauze. Condition improved for a while after the operation, but then suddenly grew much worse; patient began to bleed and died while preparations were being made to control the hæmorrhage. In this case death was undoubtedly hastened by treatment. No autopsy.

5. *House No. 1297.* Placenta prævia. The patient was in good condition at the beginning of the operation. She was delivered by accouchement forcé. Rupture of lower uterine segment and excessive hæmorrhage. The patient died of hæmorrhage 12 hours after operation. *Autopsy No. 2004.* Rupture of lower uterine segment, cervix, and vagina, but not extending into peritoneal cavity. Hæmorrhage into periuterine tissues and uterus.

6. *House No. 1548.* Cæsarean section for contracted pelvis. The patient bled profusely while the child was being removed. The bleeding continued during the removal of the uterus and could not be controlled. Patient died from shock at the end of the operation. *Autopsy No. 2176.* General anæmia of organs. Congestion and œdema of lungs.

7. *Outpatient Department No. 1370.* The patient was delivered by breech extraction. The puerperium was normal until the third day, when the patient got out of bed and had a hæmorrhage. She notified the hospital. Her condition when seen was fair, with no bleeding. She was seen later in the day and there was no further hæmorrhage. The patient was strongly advised to enter hospital, but refused. On the morning of the fourth day she again got out of bed and hæmorrhage immediately began. When seen she was in extremis and died a few minutes later. *Autopsy No. 1704.* Bicornute uterus. Vaginal septum. Rupture of uterus and vagina extending into adjoining tissue. Slight subperitoneal and retroperitoneal hæmorrhage. Anæmia of tissues.

8. *House No. 2201.* The patient was sent to the hospital after several attempts to deliver her by two doctors at her home. Her condition on admission was very poor, the pulse being rapid and weak. The patient was very fat and an abdominal examination was unsatisfactory. Vaginal examination showed rupture through the posterior wall of the uterus. A foot of the child could be grasped and an attempt was made to extract it. This proved difficult and the patient died during the attempt. *Autopsy No. 2552.* Rupture of uterus. Hæmorrhage.

GROUP IV. MISCELLANEOUS—10 CASES.

1. *House No. 962.* The patient was delivered by low forceps. The temperature immediately after the operation was 101.6°, but it fell to normal in a few hours, and never went above 100.4° afterwards; pulse normal. The puerperium was considered normal in every way. Suddenly, on the 12th day of the puerperium, while the patient's breast was being massaged, she complained of pain in the side and difficulty in breathing. She died nine hours later from pulmonary embolism. *Autopsy No. 1801.* Thrombosis of vesical veins. Occlusion of external iliac veins. Embolism of pulmonary artery and conus arteriosus.

2. *House No. 1040.* The patient was extremely fat, weighing over 300 pounds. During the second stage of labor, she showed signs of beginning exhaustion, the pulse becoming rapid and poor in quality. She was anæsthetized with ether and delivered by an easy breech extraction. The patient collapsed at the end of the operation and died. This case is classed as due to "cardiac failure." *Autopsy No. 1850.* Chronic tuberculosis of lungs, with acute localized miliary tuberculosis. Extreme obesity. Considerable remains of thymus gland.

3. *House No. 1240.* The patient had been ill for one month before admission. She had a spontaneous easy labor five days later. Two days afterwards she died of amœbic dysentery. *Autopsy No. 1977.* Ulcerative colitis (amœbic). General fibro-purulent peritonitis. Fatty degeneration of heart, liver, and kidneys. Œdema and hypostatic congestion of lungs.

4. *House No. 1256.* Cæsarean section for contracted pelvis. The patient took anæsthesia poorly and was much shocked by the operation. There was marked abdominal distension and the bowels could not be made to move. The abdomen was opened, but there were no signs of peritonitis and no definite obstruction. The small intestine was greatly distended. Many round worms could be felt in the intestines. An enterostomy was done and several round worms removed. Some gas was passed. The patient was much shocked and died a few hours later, apparently of intestinal paralysis. No autopsy.

5. *House No. 1294.* The patient, eight months' pregnant, was admitted with broken cardiac compensation and pneumonia. Patient died the next day without going into labor. No autopsy.

6. *House No. 1499.* Throughout pregnancy the patient had worn an extremely tight abdominal binding to conceal her condition. She was admitted suffering from nausea and vomiting and swelling of left leg. Her bowels had not moved for six days before admission. There was extreme œdema of the left leg. Labor was induced and delivery completed by version and extraction. The patient died 10 hours later, apparently of shock. *Autopsy No. 2121.* Thrombosis of left common iliac vein. Œdema of lungs. Arteriosclerosis.

7. *House No. 1662.* Patient had fever for nine days before delivery. Spontaneous and easy labor. Died on the 21st day of the puerperium from typhoid fever. *Autopsy No. 2252.* Healing typhoid ulcers in small intestine. Œdema and atalectasis of lungs. Bronchopneumonia. Acute spleen tumor.

8. *House No. 2158.* Cæsarean section for contracted pelvis. The patient developed intestinal obstruction from a loop of gut becoming adherent to the abdominal incision. A second operation was done and the loop freed, but the patient did not rally. *Autopsy No. 2566.* Operation wound. Laparotomy. Meteorism. Slight localized fibrinous peritonitis. Rachitic changes in bones of pelvis, legs, and ribs.

9. *House No. 2181.* Patient at term admitted to the ward in the afternoon with extreme dyspnœa, which had existed for four days. Had marked exophthalmos, enlarged thyroid, and rapid pulse. She was put to bed and seemed fairly comfortable, until about 11 p. m., when labor pains began. The child was born one hour later, apparently with a very easy labor. Immediately afterwards, before the placenta was delivered, the patient collapsed and died almost instantly. No autopsy.

10. *House No. 2229.* The patient was delivered by an extremely difficult version and extraction. The difficulty was due to a generally contracted pelvis. The morning after the operation the patient's condition was quite good, but for some abdominal distension. This increased during the day and the bowels could not be moved. Suddenly the patient became dyspnœic and the pulse became very poor and irregular. The patient died in about half an hour, 36 hours after delivery. *Autopsy No. 2587.* A loop of gut was adherent to the left horn of the uterus, and the change in the size of the uterus after delivery had caused an acute kink. Cardiac dilatation and hypertrophy. Fibrous myocarditis.

SUMMARY.

1. There were 55 maternal deaths in the 5000 cases, representing a gross mortality of 1.1%.

2. The fatalities are divided into the following groups:

Etiology.	Number of Deaths.	Gross Mortality.	Proportion of all Deaths.
I. Infections	21	0.42%	38.18%
II. Toxæmias	16	0.32%	29.09%
III. Hæmorrhages	8	0.16%	14.54%
IV. Miscellaneous	10	0.20%	18.18%

3. In Group I, 12 cases were infected before admission to the department. One patient had coitus during labor and was not examined by vagina. In two others midwives had made repeated vaginal examinations. Thus, six cases remain in which the department was responsible for the fatal infection, representing a mortality of one-eighth of one per cent.

4. In Group II there were 16 deaths, divided as follows: Eclampsia, 12; nephritis, 2; toxæmic vomiting of pregnancy, 2. The mortality from Eclampsia was 25%, which should be considered very favorable in view of the fact that the majority of the cases were admitted in coma.

5. In Group III there were eight deaths. Four of these were due to placenta prævia, and in three of them the patient was moribund on admission. In the fourth case death resulted from incomplete rupture of the uterus due to manual dilatation of the cervix. The dangers incident to accouchment forcé in this condition make it less preferable than the employment of a slower method of cervical dilatation such as the inflated rubber bag.

The remaining four deaths from hæmorrhage were associated with rupture of the uterus in three cases and with Porro Cæsarean section once.

6. In Group IV there were 10 deaths, distributed as follows:

Intestinal obstruction	3	Thrombosis	1
Typhoid fever	1	Embolism	1
Pneumonia	1	Exophthalmic goitre	1
Amœbic dysentery	1	Anæsthesia	1