

A STUDY OF THE MATERNAL DEATHS AMONG TEN THOUSAND PARTURIENT WOMEN AT THE CHICAGO LYING-IN HOSPITAL¹

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A STUDY was made of the last 10,000 parturient women admitted to the Chicago Lying-in Hospital and Dispensary with a view of analyzing the maternal deaths. These patients were admitted from November 1, 1914, to October 1, 1921, and during this time there were 39 deaths. This gives, therefore, a gross mortality of 0.39 per cent. The hospital is an open one and over three hundred different doctors send patients to it.

The age of the 39 patients varied from 18 to 42 years. Twenty patients were primiparæ and 19 were multiparæ.

The duration of the patients' stay in the hospital was as follows:

	Cases
Less than one day.....	3
One day.....	8
Two days.....	8
Three to ten days.....	11
Eleven to twenty days.....	6
More than twenty days.....	3
	<hr/> 39

Among the 39 patients, 26 babies (one twin) were born alive while 15 babies (one twin) were stillborn. However, at the time the mothers died, only 22 children were alive.

Of the 39 patients, 8 had been delivered in their homes before having been sent to the hospital. Five of these were delivered by our out-patient service while a sixth precipitated before the interne reached her home. The remaining two patients were delivered by an outside physician and a midwife respectively. Of the remaining 31 patients, 7 were ward patients, the rest being under the care of private physicians. Furthermore, of the 31 women delivered in the hospital, 6 had been examined vaginally in their homes by physicians or midwives.

Accepting Osler's statement that the normal oral temperature is rarely above 99.2°, we find that among the patients whose temperatures were recorded on admission, but 45 per cent had normal temperatures.

The manner in which these fatal cases were delivered was as follows:

	Cases
Spontaneous delivery.....	17
Spontaneous delivery after induction of labor with colpeurynter.....	1
Low forceps.....	7
Mid-forceps.....	4
Version and extraction.....	1
Forceps attempted, then version and extraction.....	1
Cæsarean section.....	7
Classic.....	6
Kroenig.....	1
Abdominal hysterectomy.....	2
Vaginal hysterotomy.....	1
	<hr/> 41 (two pairs of twins).

Two of the patients who delivered spontaneously, gave birth before the doctor reached them. Of the women who were delivered by mid-forceps, one died as the forceps were being applied. The stillborn child was extracted after maternal exitus and no rupture of the uterus or vagina was found postmortem. Another of the mid-forceps operations was performed by a midwife at the patient's home and the result was a ruptured uterus and a third degree laceration.

For the 7 patients who had cæsarean sections performed, the cause of death was as follows:

	Cases
Peritonitis.....	3 (2 Classic, 1 Kroenig)
Shock (from abruptio placentæ).....	1 (Classic)
Eclampsia.....	1 (Classic)
Toxæmia.....	2 (Classic)

The two cæsarean sections for the patients with "toxæmia" were performed under local anæsthesia (novocaine). Of the three patients who died of peritonitis, two had been examined vaginally before operation.

The cause of death for the 39 patients was as follows:

1. Puerperal sepsis.....	6 (One autopsy)
2. Peritonitis.....	6 (Two autopsies)
3. Shock.....	6 (One autopsy)
a. Ruptured uterus.....	3
b. Hæmorrhage.....	3

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4. Eclampsia.....	5
5. Embolism.....	4 (One autopsy)
6. Pneumonia.....	4
a. Influenzal.....	2
b. Lobar.....	1
c. Broncho.....	1
7. Cardiac decompensation.....	3
8. Toxæmia.....	3 (One autopsy)
9. Coronary thrombosis.....	1 (Autopsy)
10. Status lymphaticus with pulmo- nary œdema.....	1 (Autopsy)
	<hr/> 39(Eight autopsies)

PUERPERAL SEPSIS

Three of the six patients who died of puerperal sepsis were delivered before admission to the hospital. Two were delivered by the dispensary internes and these patients had easy spontaneous labors. One patient had had sexual intercourse 2 days before delivery. In neither of these 2 women had a vaginal examination been made. The third patient who gave birth before admission, delivered spontaneously a premature baby in transverse position. Cultures from the blood of the baby's heart showed gas bacilli. This patient's temperature during labor was 101.5°. Her history stated that she had had puerperal infection one and a half years previously.

Of the remaining three patients dying of puerperal sepsis, namely those delivered in the hospital, one had been examined vaginally before admission without gloves and the patient's temperature when she entered the hospital was 100.8°. The membranes had ruptured 46 hours previously and there was a foul odor to the liquor amnii. The placenta which was very adherent had to be removed manually. The second patient delivered in the hospital who died of child-bed fever, was admitted with that diagnosis, her temperature being 100.6°, her pulse 136, and her respirations 50 to the minute. Immediately after delivery her temperature was 104°. The latter two patients were delivered with low forceps. The third woman who gave birth in the hospital, delivered herself spontaneously of twins and the placenta. Eleven days post-partum she had a severe hæmorrhage which necessitated curettage and tamponade of the uterus. Placental tissue was removed at this time, and the patient died of sepsis on the fortieth day after delivery. At autopsy, the

uterus appeared normal but abscesses in both lungs were found.

Of the six patients dying of sepsis, the placenta was removed manually in two. Four babies (one twin) were born alive while three were stillborn. All the patients but one had a temperature above 100.5° on admission to the hospital.

PERITONITIS

Among the six deaths from peritonitis, three followed cæsarean section, one an abdominal hysterectomy for ruptured uterus, the fifth one resulted from a ruptured appendix, and the sixth was associated with perforations of the small intestine. For those who died after cæsarean section two different types of operation had been performed; namely, classic (2) and Kroenig (1). As was stated above, two of the three cæsareanized patients had vaginal examinations before operation.

The patient on whom the Kroenig operation was performed was a woman weighing 278 pounds, whose blood pressure was 202-120, who had œdema of the legs and abdominal wall and albumin in the urine. She was two weeks overdue (the child weighed 3963 grams) and had been in labor 83 hours before the operation was performed. During the operation the bladder was accidentally perforated. The patient died 4 days later.

The patient who died of peritonitis three days after the abdominal hysterectomy was a multipara, who was brought to the hospital after her uterus had ruptured at home 5½ hours after the beginning of the second stage of labor. Her temperature on admission was 103°.

In one of the women on whom a classic cæsarean section was performed, the abdominal wound separated all the way, before death, which occurred on the eighth day post-operative. Autopsy revealed peritonitis due to the staphylococcus aureus. The second patient who had a classic cæsarean section, like the former, died of peritonitis on the eighth day after operation, although she had also presumably been a "clean" case. Autopsy revealed pus in the uterine cavity and a very dark, necrotic-looking vagina. The infection

had evidently been an ascending one from the vagina.

The patient who died of peritonitis following a ruptured appendix, had had a spontaneous delivery at home 4 days before admission. Laparotomy under local anæsthesia revealed free pus in the abdominal cavity.

The patient who died from perforations of the small intestine, had a spontaneous delivery; but the day after delivery, her abdomen became markedly distended. The customary treatment was of no avail, and when a laparotomy was performed 8 days postpartum, much gas escaped from the abdominal cavity and perforations in the small intestine were found. The patient died the following day.

SHOCK

As was stated above, three patients died from shock caused by hæmorrhage and three died as the result of ruptured uteri. Of the patients who died from hæmorrhage one had an abruptio placentæ. She was admitted in a condition of shock, almost *in extremis*. A cæsarean section was immediately performed and a blood transfusion started soon after the incision was made, but the patient died on the table. A second patient who died of hæmorrhage was an elderly primipara who had a temperature of 101.2° during labor and who was delivered of stillborn twins by low forceps and version and extraction respectively. Because of bleeding, the placenta was removed manually and the uterus packed with gauze. There was profuse bleeding from the episiotomy wound as well as from the uterus, and the patient died on the delivery table. The third patient who lost her life because of hæmorrhage, had a spontaneous delivery and the estimated loss of blood was 1700 cubic centimeters. The uterus was examined post-mortem and found to be intact.

On one of the three patients with ruptured uteri who died of shock, an abdominal hysterectomy was performed. In this case there was a rupture of one horn of a bicornuate uterus. The second patient who died of shock from a ruptured uterus was delivered with forceps by a midwife who not only ruptured the uterus but also tore the sphincter

ani muscle. The third patient whose uterus was ruptured was delivered in the hospital. The accident occurred during a version after a forceps delivery had been unsuccessfully attempted, the patient having been in labor 51 hours. The latter two patients died shortly after the rupture occurred before an operation could be performed.

Of the four patients with ruptured uteri therefore, three died of shock while the fourth died of peritonitis following operation. In three of the cases the rupture occurred outside the hospital. On two, abdominal hysterectomy was performed, while two died before treatment could be instituted. The cause of uterine rupture for one case was forceps; for another, version; for a third, a long second stage. For the fourth the cause was unknown, the rupture having occurred outside the hospital and no definite information was obtainable.

ECLAMPSIA

Five patients died of eclampsia. Since there were during this period of time 46 patients with eclampsia the maternal mortality for this condition at the Chicago Lying-in Hospital and Dispensary was 10.9 per cent.

Two women who died had intrapartum and three had postpartum convulsions. All the patients had albumin and casts in their urine and the blood pressures ranged from 160 to 190, systolic, and from 82 to 110, diastolic. Strange to say, the number of convulsions varied inversely as the blood pressure. Thus:

	Blood pressure	Number of convulsions
Case 1	160- ?	16
Case 2	160- 86	11
Case 3	165- 82	9
Case 4	185-120	8
Case 5	190- 90	1

The first two patients listed above had spontaneous deliveries and developed convulsions postpartum. The first one was delivered at home and had fourteen convulsions before admission. The third woman was delivered by low forceps. A classic cæsarean section was performed on the fourth eclamptic because of her toxæmic symptoms, and she developed convulsions after delivery. The

last patient delivered a premature foetus (780 grams) spontaneously after labor had been induced with a colpeurynter. The second patient had a mitral stenosis and insufficiency.

Venesection was performed on four of the five women and on one a spinal puncture was also done. Four babies were born alive, while the fifth was a still-born premature foetus (780 grams). The live babies were small (2718, 2780, 2785, and the fourth unknown), and all were alive at the time their mothers died, which occurred on the first, second (two patients), third, and ninth days postpartum. The patient who had been delivered at home, was the wife of a man who subsequently married the former's sister and the latter also developed eclampsia but it was not fatal.

EMBOLISM

Two of the four patients whose deaths were attributable to embolism were up and about twelve and fourteen days respectively after delivery by low forceps. One had had a temperature of 102° for several days and one had manifestations of kidney disease. Both died suddenly, showing symptoms of embolism. A postmortem examination was made on one of these women and a large embolus was found occluding the tricuspid orifice. The embolus had its origin in a thrombus situated in the vena cava inferior and the latter in turn was an extension of a large thrombus which took origin in the left hypogastric vein.

The third patient passed away before delivery, while forceps were in place preparatory to the extraction of the child. Delivery was effected immediately after death but the baby was dead. Examination of the uterus revealed no rupture.

The fourth patient entered the hospital with an abruptio placentæ and because the bleeding had ceased, the cervix partially dilated, and uterine contractions were present, a Voorhees colpeurynter was inserted and a Spanish windlass applied to the abdomen. The colpeurynter was soon expelled and a stillborn foetus and large clots of blood followed. The placenta was immediately expressed with great ease. The amount of blood

lost was estimated at 1000 cubic centimeters. The patient left the delivery room in good condition. All through the puerperium there was a slight rise in temperature and during the last 8 days the pulse ranged between 118 and 124. She died on the twenty-second day postpartum.

In all the cases but one, the placenta was delivered by "early expression"; that is, slight pressure was made on the contracted uterus after the placenta had separated completely and was lying either in the lower uterine segment or in the vagina. In the fourth case (the patient who died on the table), the placenta was removed manually after death.

Of the four patients, three had had anæsthesia (ether) and three had been examined vaginally. Three were delivered by forceps while the fourth had a spontaneous delivery after induction of labor by means of a colpeurynter.

PNEUMONIA

The two patients who died of influenzal pneumonia, were admitted with the affection. The first entered the hospital with the foetal head on the perineum and delivered spontaneously shortly after admission. The child, which was premature (1719 grams), was still-born. The second woman had delivered spontaneously at home before the dispensary interne reached her. The entire labor had lasted 4 hours and 35 minutes, and the child was in good condition. The following day the patient was admitted to the hospital with a temperature of 104.2°. She died 2 days later of pneumonia.

The parturient woman who died of lobar pneumonia was a primipara who had a spontaneous delivery of a live child after a 22-hour labor. She was given only a few whiffs of ether. The day following delivery, pneumonia developed, and the patient succumbed to the disease 10 days later.

The fourth patient in this group was a dispensary patient who had had a spontaneous delivery, without anæsthesia, at home. She was admitted to the hospital the day after delivery with a temperature of 102.4°, and signs of bronchopneumonia. She died 2 days later.

CARDIAC DECOMPENSATION

Of the three patients who died of this complication, one was admitted in a state of decompensation, while in a second, decompensation began during labor, which was prolonged (63 hours). The entire duration of labor for the first patient was exactly 4 hours. Both women had mitral stenosis and insufficiency and in both, labor was spontaneous. Delivery in the third patient was accomplished by low forceps after a 17-hour labor, and death occurred 3 hours later in the presence of symptoms and signs of cardiac decompensation. Two patients were primiparæ, while the third was a sextipara. Two patients died on the day of delivery while the third passed away the day after delivery.

TOXÆMIA

All three patients who died of toxæmia entered the hospital with outspoken symptoms of the condition. In one parturient the toxæmia was possibly of infectious origin. Two or three weeks before delivery, this patient contracted a cold and soon thereafter began to have delusions. She was admitted to the hospital because of her insanity and on entrance had a temperature of 100°, pulse 136, jaundice, blood pressure 115-65, and albumin and casts in the urine. She was 6½ months pregnant. Dr. Archibald Church, who saw the patient in consultation, made a diagnosis of toxic delirium and advised induction of labor. The membranes were ruptured and the cervix packed with gauze. This being ineffectual, a vaginal hysterotomy was performed without any difficulty. The placenta showed staphylococci in pure culture. The delirium ceased and the temperature, which was 103° at the time of operation, dropped. However, on the nineteenth day, just as the patient appeared to be entirely well, she died suddenly of what seemed to be an embolus.

One other patient had jaundice before delivery while the third developed icterus and also delirium the day after operation. All three patients had albumin and casts in the urine, but not one had convulsions. One patient had coffee-ground vomitus and a tender liver. Two women were in the seventh month of pregnancy. The third was near term but her baby weighed only 2748 grams (6 pounds). The latter had convulsions and was transfused. However, it died during a convulsion on the fourth day, which was the day of its mother's exitus. The other two fœtus, which were premature (1190 and 1219 grams), were stillborn. As regards treatment, a vaginal hysterotomy was done in one case while in the two remaining patients, a classic cæsarean section was performed under novocaine anæsthesia. In these women, the liver was small, of a yellow tinge, and looked like a liver in the first stage of acute yellow atrophy. The patients died on fourth, sixth, and nineteenth days after operation. An autopsy on one woman disclosed no local infection.

CORONARY THROMBOSIS

The patient with this condition like the other patients with cardiac disease, had a mitral stenosis and regurgitation. She was a primipara and her labor, which lasted a little more than 5 hours, was terminated with mid-forceps. She died on the ninth day postpartum and autopsy revealed a coronary thrombosis.

STATUS LYMPHATICUS

An 18-year old primipara was delivered by mid-forceps after a 25-hour labor. An episiotomy had been performed and because of hæmorrhage, the placenta was removed manually. The patient died suddenly while the episiotomy wound was being repaired. An autopsy was performed and the thymus and mesenteric glands were found to be enlarged. Pulmonary œdema was also present.