

POLIOMYELITIS IN PREGNANCY

HOUGHTON GIFFORD, CAPT., M.C., AND R. L. HULLINGHORST, LT. COL., M.C.,
SAN FRANCISCO, CALIF.

(From the Letterman General Hospital)

FEW cases of poliomyelitis in pregnancy have been completely reported. Most reports are of isolated cases or of small series.¹⁻⁴⁴ The most extensive review of these was made by Weaver and Steiner⁴⁵ in 1944, covering 75 cases. The following case is the first one reported with virus and histologic studies on both mother and fetus. The accompanying review summarizes all available case reports of poliomyelitis in pregnancy in the American, English, French, German, and Scandinavian literature.

Case Summary

Patient was a 24-year-old para i, grav. ii, in the eighth month of pregnancy. Prenatal course, as well as entire past history, was not remarkable. Six days before entry into the hospital she became nauseated and vomited. During the following five days she experienced malaise, weakness, anorexia, and constipation. She continued to vomit sporadically. There were aches in her back, neck, sides, and legs, and a persistent temperature of 100.5° F. At time of entry, June 18, 1946, temperature was 102.2° F., pulse 130, respirations 26, blood pressure 115/75. Patient was weak and nervous. Neurological and physical examinations were negative. Red blood cells, 3.4 million, hemoglobin, 10.5 Gm., white blood cells, 11,400, with normal differential. Urine showed 2+ albumin, many fine and coarse granular casts, and 2 to 4 pus cells per high dry field. Fetal heart sounds were present.

Patient was given intravenous fluids, morphine for pain, and oxygen for dyspnea. On the third day after entry there was marked weakness, moderate nuchal rigidity, paralysis of internal rectus muscle of the right eye, and nystagmus of the left eye to lateral gaze. Water was regurgitated through the nose, and breathing was shallow. Spinal puncture showed a pressure of 360 mm. of water, with 200 cells, mostly lymphocytes. Penicillin and prostigmine were started. Fetal heart sounds were still present. Within sixteen hours the weakness became more marked, air hunger was present, and patient would not respond to external stimuli. The extremities were flaccid. Heart sounds were good. Patient was placed in a respirator, and nasal oxygen continued. Within 20 minutes the posterior pharynx began to fill with mucus; patient became cyanotic and pulse could not be felt. She was pronounced dead 62 hours after admission.

Autopsy Findings

Autopsy performed two hours after death revealed signs of asphyxia, a pregnancy of eight months, and evidence of an encephalomyelitis. The cerebrospinal fluid was cloudy, and the leptomeninges were markedly congested. Scattered areas of congestion were present throughout the subcortical white matter, basal ganglia, and brain stem. The anterior horns of the spinal cord were swollen and congested. Microscopically, there was typical perivascular infiltration by mononuclears and occasional neutrophilic polymorphonuclears. In focal areas in the parietal cortex, basal ganglia, cerebellum, pons, and medulla, neurons showed swollen cell bodies, clumping of Nissl substance, loss of nuclear detail, satellitosis, and neuronophagia. Similar changes were present in the spinal cord, particularly in the region of the anterior horns.

Examination of the gravid uterus revealed a well-developed and well-nourished fetus weighing 2750 Gm. and measuring 48 cm. in crown-heel length. Maceration was not present. Scattered petechiae of serosal surfaces were the only gross abnormalities. Multiple sections of cerebrum, cerebellum, brain stem, and spinal cord revealed no abnormalities microscopically.

Through the courtesy of the Hooper Foundation of the University of California, virus studies of brain and spinal cord of both mother and fetus were performed. Poliomyelitis virus was isolated from the maternal tissue, but could not be demonstrated in the fetus.

Discussion

An analysis of 170 cases (case reported here included) of poliomyelitis in pregnancy was made. This includes practically all of the cases reported, with the exception of those analyzed by Aycock⁴⁶ only with regard to the stage of pregnancy and sex of fetus. Many of the cases included here have been reviewed in part in previous reports.

In 150 instances, the age of the mother is stated. In Fig. 1, with consideration of the sources from which the material is drawn, it is shown that there is no significant variation from the expected normal age incidence of pregnancy.

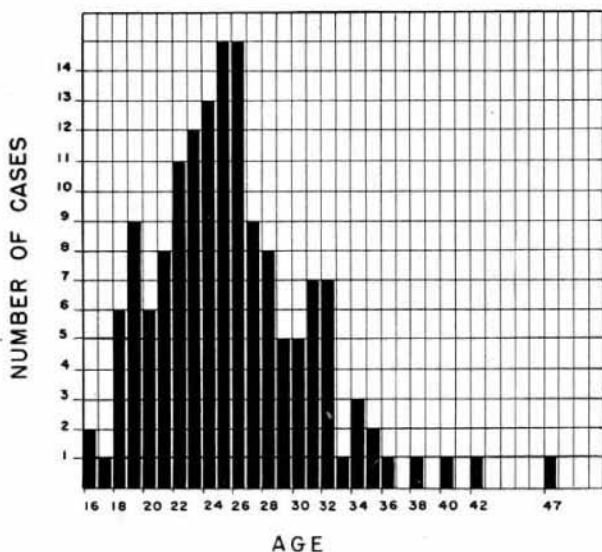


Fig. 1.—Age distribution.

There are 56 instances in which the number of previous pregnancies is stated. Fig. 2 shows no significant variation from the expected normal, the majority being cases of first or second pregnancy.

In 1941, Aycock²⁷ stated that data collected by him from 56 cases suggested a slight tendency for poliomyelitis to occur more frequently in the last trimester. Weaver and Steiner⁴⁵ in their review of 75 cases showed fewer cases to occur in the first trimester. Their animal experiments likewise supported this view. In

1946, Aycock⁴⁶ stated that there appeared to be no tendency for poliomyelitis to occur at any specific period of pregnancy. In 166 of the cases reviewed here, the stage of pregnancy is listed. Analysis shows the following incidence:

First trimester	22 per cent
Second trimester	35 per cent
Third trimester	40 per cent
Post partum	3 per cent

This again suggests increased resistance in the first trimester. However, analysis by months reveals that the incidence in the third month is second only to that in the ninth month (Fig. 3). Apparently the low incidence recorded in the first trimester is due to incomplete reporting, or failure to recognize pregnancy in the first two months.

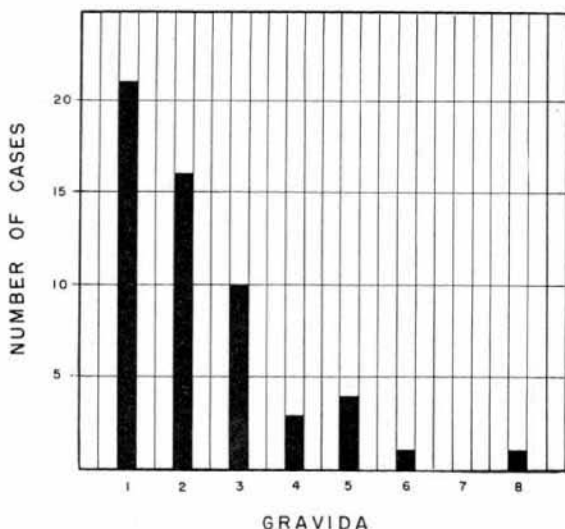


Fig. 2.—Number of pregnancies.

It is now recognized that epidemics vary as to attack rate, incidence and severity of paralysis, and type of paralysis. As early as 1913 Wickman⁹ estimated that 25 to 56 per cent of cases of poliomyelitis were nonparalytic, and 6 per cent were bulbar in type. Analyses of recent epidemics show great variation around these general estimates.⁴⁷⁻⁴⁹ Most data, however, disregard sex and age, and do not allow for comparison with the cases reviewed here. Of these 170 cases, the following is the incidence of type involvement:

Bulbar	23 per cent
Spinal	37 per cent
Aparalytic	8 per cent
Not reported	32 per cent

It is felt that the 23 per cent incidence of bulbar paralysis here is probably higher than the average incidence of such involvement in adult females in epidemics of poliomyelitis.

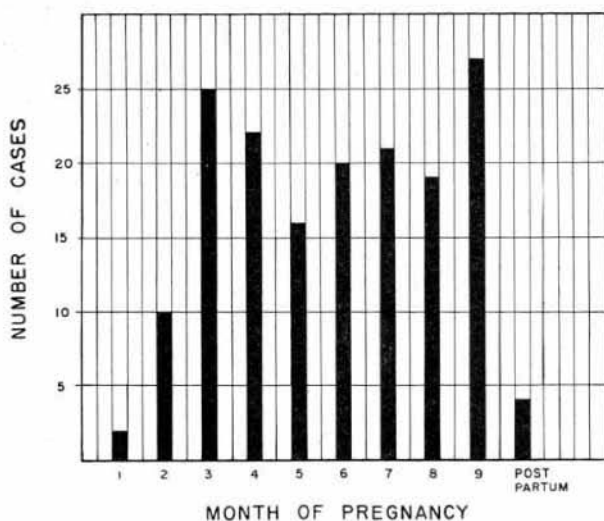


Fig. 3.—Stage of pregnancy

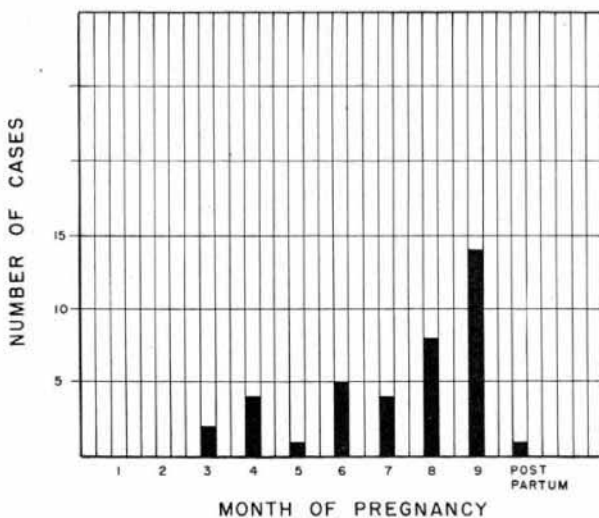


Fig. 4.—Bulbar cases by stages of pregnancy.

Investigation of the 39 bulbar cases shows a marked increase in incidence in the last two months of pregnancy (Fig. 4). An explanation of this fact may lie in the increased mechanical difficulty of respiration normally found in pregnancy. This extra load may either make latent cases of bulbar paralysis apparent or increase the respiratory difficulty in frank bulbar cases. Strauss and Bluestone⁴³ report a case of a pregnant woman maintained in a respirator from the fifth to the eighth month of pregnancy. With the progress of the pregnancy, it was noted that both the rate and pressure of the respirator had to be increased to compensate for the increasing resistance to diaphragmatic motion produced by the enlarging uterus.

Fetal deaths are reported in 45 instances (26 per cent of cases) and show the following groupings:

1. Type of Maternal Paralysis	
Spinal	15
Bulbar	14
Aparalytic	4
Not reported	12
2. Type of Fetal Death	
Spontaneous abortion	13
Therapeutic abortion	1
Prematurity	3
Stillbirth	7
Cesarean section	6
Undelivered (maternal death)	14
Not reported	1

Nine of the 13 abortions occurred in cases of spinal type paralysis and 3 in aparalytic cases. In one case, the type of paralysis is not reported. Of the 7 premature births, 3 occurred in cases of spinal type paralysis, 1 in bulbar, and 3 in cases in which the type of paralysis is unreported. None of the cases showing bulbar involvement aborted. Only one bulbar case delivered prematurely.

No maternal deaths are reported associated with premature births. This, together with the low incidence of premature births in bulbar cases, suggests that precipitous delivery seldom occurs during an anoxic or agonal period.

Thirty-two maternal deaths, a mortality of 19 per cent, are reported. Of these, 26 showed bulbar involvement, and, in the other 6 cases, the type of involvement is not stated. In the first group, cesarean section (7 cases) may have caused or contributed to death. In the second group, with unreported type of involvement, only one cesarean section was done. The other five deaths were most likely due to respiratory paralysis.

According to numerous authors,^{14, 21, 25, 35} respiratory paralysis in the latter months of pregnancy is an indication for cesarean section, not only to obtain a viable child, but to relieve the respiratory distress of the mother. Yet there have been no series of cases of this kind published. In this series, there are 17 cesarean sections reported. The type paralysis, and effect on mother and fetus are as follows:

TYPE PARALYSIS		MATERNAL DEATH	FETAL DEATH
Spinal	2	0	1
Bulbar	9	7	2
Not reported	6	1	3
	—	—	—
	17	8	6

All 6 deaths of issue occurred in the fifth to eighth month of gestation. All 7 of the babies delivered by cesarean section during the ninth month and 2 of the 4 delivered during the eighth month lived.

Several authors^{20, 50-54} have recorded postnatal findings which are very questionably poliomyelitic in nature, and in which there is no definite proof of poliomyelitis being transmitted from mother to fetus in utero. However, poliomyelitis may be acquired by the newborn infant. Bierman and Piszczek³⁷ report a case of poliomyelitis in an 11-day-old infant, the mother having shown signs of poliomyelitis twenty-four hours antepartum. Aycock³⁷ reports the apparent transmission of poliomyelitis, contracted by the mother at term, to a 12-day-old infant. A case reported by Palmstierna³⁹ is particularly worthy of note. The mother died from poliomyelitis during cesarean section. The apparently normal child showed signs and spinal fluid findings of poliomyelitis twelve days postpartum. Since the child had no contact with the mother, this case is advanced by the author as a possible example of intrauterine transmission of the disease. However, the late development of poliomyelitis in the child suggests an extra-uterine transmission.

In all the cases studied in this review, no definite clinical evidence of intra-uterine transmission of poliomyelitis has been found. This does not necessarily mean that the placenta acts as a barrier against such transmission. In man, the poliomyelitis virus has been isolated from the blood stream in only one instance.⁵⁵ Hence the placenta is rarely, if ever, exposed.

Careful postmortem studies of both mother and baby have been reported in only a few instances. Harmon and Hoyne³⁴ reported a case in which virus studies on the spinal cord of the fetus were negative. In autopsy on two undelivered maternal fatalities, Waaler⁴² found no histologic evidence of poliomyelitis in the central nervous systems of the fetuses. The case presented here showed maternal poliomyelitis by histologic and virologic studies. There was no evidence of poliomyelitis in the fetus demonstrable by either means.

Summary and Conclusions

1. An analysis of 170 cases of poliomyelitis in pregnancy is presented.
2. The age, number of previous pregnancies, and stage of pregnancy do not appear to be factors in the susceptibility of the pregnant woman to poliomyelitis.
3. Bulbar type of paralysis shows an incidence of 23 per cent. The incidence of bulbar involvement is increased in the last trimester of pregnancy.
4. Bulbar poliomyelitis shows no tendency to result in abortion or premature birth, or to cause precipitous delivery.
5. A maternal mortality of 19 per cent and a fetal mortality of 26 per cent is reported. One-third of the fetal deaths were intrauterine and undelivered, associated with maternal death.
6. Cesarean section offers a good opportunity to obtain a viable child, when death of mother is imminent.
7. Poliomyelitis may be transmitted to the newborn, but there is no definite clinical, histologic, or virologic evidence of its transmission in utero.

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