ACUTE BULBAR POLIOMYELITIS IN LATE PREGNANCY

BY

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Acute bulbar poliomyelitis occurring in a pregnant woman at or near term is rare in this country. There are a number of reports of the complication in the foreign literature, but none in the British, and therefore a description of the event in a patient who, at her death, was delivered of a living child by caesarean section should be of interest. This tells of the difficulties of diagnosis and management encountered when the contingency arose, and of measures taken to prevent the development of the disease in the offspring.

Case Report

A gravida-eight-plus-one aged 42 was accepted as an emergency admission at 4 p.m. on August 17, 1959. The expected date of confinement was August 24. Antenatal progress had been uneventful. There had been seven normal confinements between 1939 and 1951, and one spontaneous miscarriage in 1945, and she had always been healthy and free from allergy. She had been well until she ate some meat pie three days previously, when she developed diarrhoea and vomiting, which had almost ceased by the time of her admission. Her husband also ate the pie and suffered similar symptoms. She had noticed a tight feeling in her throat since the previous night and difficulty in breathing, gradually becoming worse.

On her admission the temperature was 96.2° F. (35.7° C.), pulse 120, respirations 30, and blood-pressure 120/70. She was rather obese, cyanosed, and distressed, and she felt more comfortable sitting up. The heart was normal, the lungs were clear, and breathing was shallow, apart from an occasional deep inspiration involving the accessory muscles of respiration. A radiograph showed the left hemidiaphragm to be elevated, but no other abnormality. The reflexes were brisk and plantar responses normal. There was, however, some difficulty in swallowing. The superficial veins in both legs showed marked varicosity but no evidence of thrombosis.

The uterus was enlarged to correspond with a term pregnancy. A single foetus was present, the head presenting and engaged in the right occipito-anterior position. The foetal heart was regular at 140 beats a minute.

Laboratory Studies.—Urine: S.G. 1020; albumin and acetone present, and a trace of sugar. Blood urea, 50 mg./100 ml.; serum electrolytes—sodium 145 mEq/l., potassium 4 mEq/l., chloride 101 mEq/l.; CO₂ combining power 16.2 mEq/l.; C.S.F.—330 polymorphs/c.mm.; protein, 60 mg./100 ml.; globulin, slight excess; chlorides, 740 mg./100 ml.; sugar, 100 mg./100 ml.; Lange curve, 0011110000; culture sterile. E.C.G. showed no abnormal features.

The patient was propped up in bed and given oxygen by the B.L.B. mask and an intravenous infusion of 5% dextrose. Two hours after admission low rupture of the

membranes was performed without anaesthesia. The condition deteriorated in the next two hours. The breathing became irregular, and at 8.45 p.m., four and three-quarter hours after admission, she vomited, became cyanosed, and her heart stopped beating. Intermittent positive-pressure respiration was initiated through a face-mask connected to a Boyle machine. The left chest was opened and the heart massaged through the intact pericardium and then through a pericardial incision. Without further delay a classical caesarean section was performed and an apparently healthy living female infant was delivered. Meanwhile an endotracheal tube had been passed and artificial respiration continued, together with cardiac massage. There were no spontaneous myocardial contractions. Adrenaline solution, 0.5 mg. of 1 in 1,000, was injected into the ventricular muscles without avail. Efforts to revive the patient were abandoned at 10.30 p.m., one and three-quarter hours after the heart had ceased to beat spontaneously.

Necropsy Findings.—Face cyanosed. Larynx, trachea, and bronchi congested. Lungs: all lobes congested and partially collapsed. Myocardium and valves normal, coronary vessels patent. Alimentary system—no abnormality seen. Uterus—muscle healthy and well contracted, with incision due to caesarean section. C.N.S.—slight generalized swelling of the brain. **Histology.**—Lesions typical of acute poliomyelitis were identified in the medulla, and in cervical and thoracic portions of the spinal cord. Type 1 virus was grown from the faeces and from sections of the intestinal canal and the spinal cord.

Progress of the Infant

The newborn female infant, who weighed 5 lb. 11 oz. (2,580 g.), was transferred at once to the isolation hospital, as it was thought that the mother's illness might be acute poliomyelitis. She had cried on delivery. The respirations, at first shallow, irregular, and mainly abdominal, and about 70 a minute, gradually became regular and abdominothoracic. The rate declined to 42 a minute in eight hours. The heart rate was 168 a minute at birth but fell to 125 in the same period. The temperature was 98.4° F. (36.9° C.). Muscle tone was good and the central nervous system was clinically normal.

On August 18, 21 hours after birth, the infant was given 500 mg. of gamma-globulin intramuscularly. Specimens of stool were sent for virus culture on the fifth day of life (August 22) and at weekly intervals thereafter. Poliomyelitis type 1 was isolated from the first specimen submitted and the stools did not finally become negative for the virus until the thirteenth week of life.

The infant's progress was satisfactory. She took feeds well, gained weight steadily, and did not show any disturbance of temperature or clinical sign of poliomyelitis during the 15½ weeks under observation in hospital.

Results of the serological tests against the three types of virus are shown in the Table.

Table Showing Initial Low Antibody Titre of Infant's Serum Against all Three Types of Poliovirus, and Rise in Titre Against Type 1 Virus, the Infecting Organism

Serum Date of Specimen	Age of Infant Weeks	Neutralizing Antibody Titre Against Poliomyelitis Virus		
		Type 1	Type 2	Type 3
August 24, 1959 ..	1	1/16	1/256	1/32
November 12, 1959 ..	12	1/1,024	1/16	1/8
January 6, 1960 ..	20	1/512	1/16	< 1/8
February 3, 1960 ..	24	1/1,024	< 1/8	Insufficient
March 18, 1960 ..	31	1/2,048	1/256	1/64

The rise in antibody titre for all three types on March 18 was due to active immunization with Salk-type vaccine ("polimylex," Burroughs Wellcome), at 25 and at 29 weeks of age.

Discussion

Most authorities believe that pregnancy predisposes to poliomyelitis (Bates, 1955; Rindge, 1957). Whether the disease is more common in certain trimesters is doubtful.

Bergquist and Sadler (1955) are of the opinion that patients in the third trimester are more likely to be affected than those in the first and second trimesters, while Siegel and Greenberg (1955) found that most paralytic cases among pregnant women had their onset between the third and fifth months of gestation with a secondary rise in the last two. They also concluded that pregnant women with large families are more likely to contract the infection than those with small families, presumably because the former may be exposed to a greater mass or circulation of poliovirus within the family circle.

When infection does occur during pregnancy, the end-result may be abortion, stillbirth, or a healthy infant who may or may not develop the disease in the neonatal period. In Aycock's (1941) series, for instance, of 56 cases of paralytic poliomyelitis in pregnancy 26 normal infants were born and remained healthy, 4 appeared to develop symptoms of poliomyelitis in the neonatal period, and 14 died or were stillborn. In 12 there is no note regarding the outcome.

The nearer to term the infection is contracted the greater the danger to the mother and her offspring (Abramson *et al.*, 1953; Bates, 1955; Bergquist and Sadler, 1955). At this stage of pregnancy the bulbar type of the disease is especially common, and in most cases is rapidly progressive. It begins with general malaise, nausea, and vomiting, followed by increasing muscle-weakness and respiratory embarrassment. Often the diaphragm and muscles of the lower two-thirds of the chest are paralysed and there may be quadriplegia as well. The maternal mortality is high, and death of the foetus is inevitable unless labour has begun and proceeds to its termination without complications, or unless rapid and successful caesarean section is performed. Section is imperative when breathing becomes affected, and in this event tracheotomy and some form of mechanical aid to respiration are mandatory.

In a few cases the infant has been delivered by section coincident with or immediately after the death of the mother. Swarts and Kercher (1954) reported the case of an infant delivered by section within five minutes of the death of the mother from undiagnosed poliomyelitis. The newborn baby developed signs of paralysis on the 10th day and died on the 12th. Type 1 was isolated from the infant's and the mother's spinal cord. Winsser *et al.* (1957) cite four additional cases in which caesarean section was performed just before or just after the mother had died from bulbar poliomyelitis. Two of the newborn infants developed the disease and two remained healthy. Rindge (1957) mentions two infants delivered by post-mortem caesarean section in her series of 79 pregnant women with poliomyelitis. One was stillborn and the other died in 10 hours.

Poliomyelitis is relatively uncommon in infants under 1 year of age, and is still more uncommon under 6 months, owing to passive immunity acquired by trans-placental transmission of maternal antibody. Infants born to women acutely ill with poliomyelitis are naturally deficient in protective antibody, so that the great majority of them contract the disease within the first three weeks of life and the fatality rate is high.

The present report concerns an infant, delivered by section on the death of the mother, who thrived and did not develop paralysis, but must have been infected by the mother, because she passed type 1 virus in her stools from at least the fifth day for the next 12 or so weeks,

the same virus having been isolated from the maternal stools and tissues taken at necropsy.

There has been much discussion on whether newborns developing poliomyelitis have done so as a result of viraemic transmission *in utero* or because of imbibition of infected material during delivery. In a small number of cases the evidence put forward that viraemic infection of the foetus has occurred is highly suggestive (Kreibich and Wolf, 1950; Shelokov and Weinstein, 1951; Abramson *et al.*, 1953; Schaeffer *et al.*, 1954; Bates, 1955; Barsky and Beale, 1957; Winsser *et al.*, 1957). The incubation period of poliomyelitis is between the approximate limits of 5 to 25 days, so that Winsser's contention that there is virtually no other explanation than intrauterine infection in the few that become paralysed within the first two or three days of life seems reasonable. However, in most of the reported cases of neonatal poliomyelitis the paralysis has developed later, towards the end of the second or in the third week, a time lapse that favours the oral route of infection at the time of birth.

We did not collect blood for poliovirus culture from our infant when she was born. The presence of type 1 virus in her stools five days after birth suggests that her infection was acquired orally, but whether *in utero* or during delivery is a matter of conjecture. The initial low serological titres of neutralizing antibody against all three types of poliovirus reflect the lack of protection afforded by the mother before her death, and the subsequent rise in type 1 antibody is marked and in contrast to the standstill in the antibody titres to types 2 and 3 (see Table). In similar circumstances in the future it might be informative if virus studies of the placenta and of the blood and stools of the newborn were made from the day of birth.

The administration of gamma-globulin to the infant on the first day of life may have protected the nervous system during the blood-borne phase of the infection. As can be seen from the rise in the titre of neutralizing antibody against type 1 virus (see Table), the administration did not interfere with the process of silent active immunization against the virus. In this connexion it may be recalled that Koprowski *et al.* (1956) have shown that active immunization can be induced in older children given immune serum globulin at the same time as virus by mouth. However, the real answer to the problem of poliomyelitis in pregnancy is prophylaxis; for, as has been demonstrated by Strean *et al.* (1957), successful vaccination of the prospective mother will protect the newborn during the first four months of life because adequate amounts of maternal antibody are transmitted to the foetus as a result of the procedure.

Summary

This report describes the last hours of a pregnant woman who contracted poliomyelitis near term, and the delivery of a living child by caesarean section at the time of her death.

Gamma-globulin was administered to the newborn infant on the first day of life. On the fifth day and for 12 weeks thereafter poliovirus type 1 was isolated from the stools. The infant at no time showed clinical signs of the disease.

Some of the facts and the factors concerning poliomyelitis in pregnancy and in the neonate are briefly discussed, and reference is made to the appropriate literature.

We thank Mr. R. W. Knowlton, under whose care the patient was admitted, for permission to publish this case.

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Medical Memoranda

Omental Endometriosis

The following case is recorded because involvement of the omentum by endometriosis is apparently rare.

CASE HISTORY

The patient, aged 24, did not begin to menstruate until the age of 19, although from the age of 14 she suffered some monthly pain. At the time of admission to hospital (September 21, 1959) the cycle was irregular, every 21–35 days, with a moderate loss from 2 to 14 days. Dysmenorrhoea began two days before the onset of the menstrual flow and persisted until the loss ceased. Pain was sufficient to keep her awake. She had been married for two years, and, although anxious to conceive, had not done so. There was no dyspareunia.

On examination the patient's general condition and development were normal. Abdominal examination revealed no abnormality. The lower genital tract was healthy, but the cervix was small and apparently almost buried in the vault. The uterus was axial and of normal size. There was a left-sided tender fixed adnexal swelling the size of a walnut.

Examination under anaesthesia and laparotomy were undertaken on September 24 by Mr. John Beattie. Upon opening the abdomen a tongue of omentum was found adherent in the depths of the pelvis. When this was separated the extremity of the omentum was seen to contain an area, approximately 1 cm. in diameter, of a different texture and with a homogeneous grey cut surface. This area was removed for biopsy. The left ovary contained a cyst of chocolate appearance measuring 2.5 cm. in diameter, and was adherent to the back of the broad ligament. The right ovary was similarly adherent but of normal size, although the typical black "peacock's eye" spots of endometriosis were present. The fallopian tubes appeared normal and patent to retrograde insufflation. Left ovarian cystectomy, with the removal of other "spots" of endometriosis, and presacral neurectomy were carried out. Convalescence was uneventful.

Pathology.—Section of the removed omentum (see Fig.) showed islands of endometriosis in the form of proliferative phase glands and stroma among typical adipose tissue. Tissue from the left ovary showed a cyst containing blood and lined by fibrous tissue. An innermost layer of columnar epithelium was composed of cells with darkly staining nuclei; similar tubular projections extended into the stroma. The interstitial portion of the wall of the cyst also contained endometrial tubules and pseudoxanthoma cells.

COMMENT

This case of endometriosis involving the greater omentum raises the question of why such findings are not more frequent. The "abdominal policeman" is a frequent bystander at any infective process within the pelvis, particularly if this is relatively subacute, and will sometimes respond as well to the slow leak of blood from a tubal abortion. Many diverse sites for endometriosis have been described by Novak and Novak

Photomicrograph of removed omentum, showing islands of endometriosis.

(1958), but the omentum is omitted. They emphasize the occurrence of endometrial islands on any part of the peritoneum as being characteristically below the pelvic brim and correspondingly rare in abdominal viscera at a higher level. The appendix and small intestine constitute the occasional exceptions, probably owing to their frequent attendance in the pelvis.

It is possible that in the above case the tag of omentum was primarily attached in the pelvis after some episode for which history is lacking, and was secondarily involved in the endometriomatous disease process.

The primary condition might have been the rupture of a small endometrial cyst, yet the reason the omentum does not more frequently attempt localization of the irritant process of endometriosis is curious.

I am grateful to Mr. John Beattie for encouragement and permission to publish this case.

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A leaflet about smoking and lung cancer believed to be particularly suitable for the intelligent teenager has been written for the Chest and Heart Association by Dr. J. L. BURN, medical officer of health, Salford, Lancashire. Specimen copies of the leaflet, *Smoking—a Message from an M.O.H.*, will be sent free to anyone interested. Additional copies may be bought from the C.H.A. (Tavistock House North, Tavistock Square, London W.C.1) at 2d. a copy, or 15s. a hundred.