

PERINATAL DEATH DUE TO ABRUPTIO PLACENTAE IN AN AFRICAN CITY

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Abstract. Abruption placentae was a common cause of perinatal death in Addis Ababa, Ethiopia in 1974–1975 with a frequency of 5.5/1 000 births. The disorder had its peak frequency at term. No abnormalities were found in the placentas to explain the placental abruptions but there were other clues to their genesis. There was a strong association of the fatal abruptions with severe poverty in the mothers. These poor mothers were both undernourished and malnourished during pregnancy. Their fetuses and neonates who died had multiple evidences of undernutrition including a relative undergrowth of adrenals, spleens and livers and a relative acceleration of lung maturation. These findings support observations in more prosperous nations that poor nutrition of the gravida may have an important role in the genesis of abruption placentae.

A recent study found abruption placentae to be the fourth most common cause of perinatal death in Addis Ababa, Ethiopia with a frequency of 5.5/1 000 births (9). The frequency is nearly the same in U.S. cities but it is far from certain that the pathogenesis of the disorder is the same in the two nations. In the U.S. about 20% of such deaths are due to cigarette smoking which causes a selective necrosis in the decidua basalis at the margin of the placenta and another 10% are caused by large placental infarcts (8). Very few women in Addis Ababa use tobacco in any form and the frequency of infarcts in their placentas has not been determined. Poor gestational nutrition might play a role in abruption placentae in both nations. Most women in Addis Ababa are both undernourished and malnourished during pregnancy while suboptimal pregnancy weight gain is a common feature of abruption placentae in the USA (1, 8).

The present study searched for the causes of abruption placentae in Addis Ababa by analyzing data from a large study of pregnancies in that city.

MATERIALS

A study of perinatal mortality was undertaken in Addis Ababa, Ethiopia in 1974–1975 in the hospitals and clinics affiliated to the Addis Ababa University Faculty of Medicine. About 40% of the births in the city take place in these facilities which serve all segments of the population. Sixty-six stillbirths and twenty neonatal deaths were placed in the abruption placentae category when inspection showed an adherent retroplacental clot with depression or disruption of the underlying placental tissue or when there were otherwise classical clinical findings including external or occult bleeding, increased firmness of the uterus and death between 20 weeks of gestation and the twenty-eighth postnatal day with evidence of hypoxia including aspirated squames and petechiae on the surface of the visceral organs. All of the infants had postmortem examinations. Abruption cases that were the consequence of severe preeclampsia or eclampsia were placed in another diagnostic category and excluded from the present analyses.

The pregnancies that ended with fatal abruptions were compared with 568 successful pregnancies, selected to be representative of the delivery population. These controls were comprised of the first ten deliveries after 8 AM each day that produced infants who survived the neonatal period. Hospital and clinic records in conjunction with a detailed maternal interview and physical examination on the day after delivery provided 124 medical, demographic and other items of information for analysis on most of the cases. The information collected included durations of pregnancy based on a church calender well known to most women, mother's education, size and sources of income, specific expenditures for food, water and other items, place and duration of residence, housing density, tribe, religion, details of employment, facilities for excreta disposal, sources of water, age of first marriage and duration and status of marriages.

Data were also collected on maternal age, prior obstetrical history, wanted/unwanted status of the pregnancy, efforts at contraception, abortifacients, gestational hypertension, peripheral edema, vaginal bleeding, hydatemios, jaundice, parasites, venereal diseases including serologic tests for syphilis, other specific disorders during gestation, number of visits for prenatal care, blood hemoglobin values, blood groups, leukocyte counts and medications taken during pregnancy. Information was

Table I. The influence of primary maternal and family factors on perinatal mortality rates due to abruptio placentae

Eth \$2.05=US \$1.00

	Perinatal mortality (rate/1 000 births)	
Family income in Eth \$/month		
None	37.0	} $P<0.001$
1-140	5.8	
141-800	1.5	
Over 800	0	
Mother had prenatal medical care		
Yes	3.2	
No	11.3	
Maternal diastolic blood pressure during labor		
Under 70 mmHg	8.6	} $P<0.004$
71-80	3.9	
81-95	2.1	
Over 95	2.7	

also collected on details of labor and delivery, fetal distress, Apgar scores, infant blood groups and the clinical course of the neonate and mother after delivery.

In each well preserved case, body and organ measurements were calculated in percent of mean normal autopsy values as published by Gruenwald and Minh (2). A mean percent of normal published values was then calculated for each organ or body measurement for the group as a whole. Infants of multiple births and those with major congenital anomalies or known diabetic mothers were excluded from the study. Well preserved lungs were histologically graded for their stage of maturity by the system of Platt (5, 6). Four specially trained technicians reviewed microscopic sections from the 80 well preserved placentas of the fatal abruptio cases and from the 507 placentas available from the successful pregnancies. Nonroutine abnormalities were checked by the present senior author.

STATISTICAL METHODS

Details have recently been published on the statistical methods used to determine which of the many variables were primarily related to the abruptio placentae fatalities (7). Primary variables were judged to be those that had a significant influence on the mortality rates without being dependent on other variables. First, the frequency of each variable in the fatal cases was compared with its frequency in the controls using the chi-square test in two-way contingency tables. This resulted in a shortened list that included both primary and secondary variables (Table I). Cases in which observations were missing for a particular variable were excluded only in analyses involving that variable so that the statistical analyses were based on the entire data set.

A log-linear model analysis of contingency tables was

carried out on the smaller set of variables. The interrelationships of all possible pairs of these variables were then determined on the frequency of perinatal mortality due to abruptio placentae. Tests for zero three-factor interactions were performed in the resulting 3-way contingency tables. Variables which had a significant influence on the frequency of fatal abruptio placentae without being dependent on other variables are found in Table I.

RESULTS

The frequency of the perinatal deaths due to abruptio placentae was 5.5/1000 births and their peak was at term (Fig. 1). The organs of the infants who died were growth retarded. Adrenals, spleens, livers and hearts were more affected than bone growth as reflected in body length. The brains were not growth retarded (Fig. 2). Fetal lung maturation was accelerated at all gestational ages in the fatal abruptio cases by comparison with U.S. controls (Table II). The only placental abnormality detected in the abruptio cases was an increased frequency of infarcts under 3 cm in diameter, so-called small infarcts (8). They had a frequency of 12% in the abruptio cases and only 1% in the surviving controls ($P<0.0001$). None of the abruptio cases had larger placental infarcts. Both the abruptio cases and the controls had only a 2% frequency of necrosis of the decidua basalis at the margin of the placenta. None of the umbilical cords in either the abruptio cases or the controls were less than 20 cm

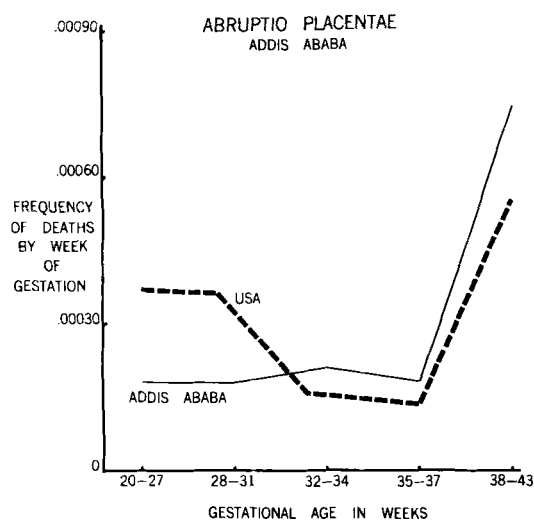


Fig. 1. Perinatal deaths due to abruptio placentae had a peak at term in both Addis Ababa and in 12 U.S. cities (8).

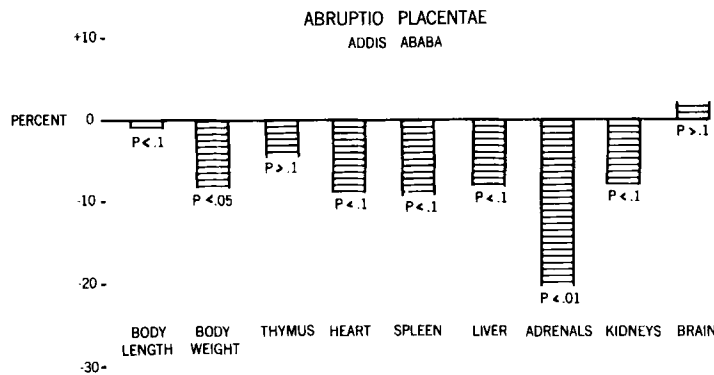


Fig. 2. Organ and body measurements from fetuses and neonates who died as a consequence of abruptio placentae significantly deviated from published control values. The deviations are in percentages. Adrenals, livers and thymuses were more affected than brains and most other organs. Student's *t*-test was used to determine the significance of the deviations.

long so none were considered to be abnormally short.

The fatalities were strongly associated with extreme poverty and lack of maternal prenatal medical care (Table I). The deaths were more frequent with maternal diastolic blood pressures under 70 mmHg than with higher pressures. Blood loss was greater in many of those with the lower pressures. The mean height of mothers who had the fatal abruptions was 153.2 cm and the controls 156.2 cm ($P > 0.1$). The mean body weight of the mothers who had the abruptions was 50.1 kg on the day after delivery and for the controls 51.0 ($P > 0.1$). Pregnancy weight gain data were not available on enough of the abruption cases to make a meaningful analysis possible.

None of the following maternal factors had any significant influence on perinatal death rates due to placental abruptions: age, cigarette smoking, tribe, religion, rural or urban residence, type of facility used for excreta disposal, number of sexual partners, number of prior pregnancies, preterm deliveries and perinatal losses. There was also no association of the deaths with the following pregnancy factors: specific maternal illnesses including parasitic infections, medications used, type of work by mother, her hemoglobin levels, proteinuria, peripheral edema and hydramnios. The deaths did not relate to the infant's sex, presentation at delivery, duration of labor or the use of oxytocic or anesthetic agents.

DISCUSSION

Abruptio placentae is initiated by hemorrhage into the decidua basalis which then splits, leading to separation of the placenta from the uterine wall.

The traditional explanations for the separations, trauma, hydramnios, short umbilical cords and congenital anomalies will explain none of the fatal abruptions in the present study (3, 10, 11). In fact, such causes explained only a few percent of the fatal abruptions in a recent, large U.S. study (8). About 30% of the U.S. cases were explained by decidual necrosis at the margin of the placenta and by large placental infarcts, lesions not responsible for the Addis Ababa abruptions. The only placental abnormality detected in the Ethiopian abruptio cases was an increased frequency of small placental infarcts. However, they were found in only 12% of cases and such small infarcts are present in about 18% of placentas in successful U.S. pregnancies (8).

Other findings in the study offer clues to the genesis of the placental abruptions. There was a very strong association of the fatal abruptions with severe poverty. Gestational undernutrition and malnutrition are common in Addis Ababa, particularly in the poor who must spend most of their incomes on food (1). The resultant diets are mark-

Table II. Mean grades for histologic maturity (5)

Fetal lung maturity in the abruptio cases was accelerated at every gestational age by comparison with U.S. controls (6)

Gestational age (weeks)	U.S. controls	Addis Ababa abruptio placentae
20-24	2.4 ± 1.1 (105)	3.3 ± 0.7 (9) $P < 0.01$
25-27	3.8 ± 0.6 (97)	3.9 ± 0.6 (7) $P > 0.1$
28-32	4.0 ± 1.4 (109)	5.3 ± 0.7 (9) $P < 0.01$
Over 32	5.8 ± 0.5 (114)	6.0 ± 0 (48) $P < 0.01$

Number of cases are in parentheses. Mean values are are ± 1 S.D.

edly deficient in calories, vitamin A and calcium, somewhat less deficient in protein and generally adequate in other vitamins including folic acid (1). These nutritional deficiencies were the likely cause of the fetal growth retardation in the abruptio victims. The victims had normally grown brains and growth retarded adrenals, spleens and livers, a pattern characteristic of fetal undernutrition (4). A similar pattern of fetal growth retardation was recently found in U.S. victims of abruptio placentae (8). The accelerated lung maturation found in the abruptio victims of the present study has been previously reported in undernourished neonates and related to gestational undernutrition in their mothers (5, 6). Thus, findings in the present study support a previous suggestion that undernutrition or malnutrition of the gravida may predispose to abruptio placentae (8). The placental or uterine mechanisms through which this might be effected are not known.

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