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SEVERE NEONATAL ANEMIA DUE TO MASSIVE TRANSPLACENTAL HEMORRHAGE

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Anemia in the newborn is usually of the hemolytic type and is the result of destruction of fetal blood cells by incompatible maternal antibodies. Occasionally, a neonate presents with anemia on the basis of a ruptured abdominal visceral organ. There is a small group of infants with posthemorrhagic anemia caused by overt external bleeding at or during the time of delivery after obstetric complications such as tearing of umbilical vessels, placenta praevia, or abruptio placentae. There remains, however, an occasional infant with profound anemia where no immunologic incompatibility exists, where no abnormal obstetrical bleeding occurs, and where the placenta at delivery is grossly normal. Wiener[11] has explained the last situation by a mechanism of occult hemorrhage of the fetal blood into the maternal circulation by a transplacental route. Furthermore, he postulated that ruptured placental blood vessels in the fetal surfaces permitted entrance of the infant's blood into the maternal blood stream. Since his observation, other authors[1, 5, 8, 9] have described this mechanism as playing the causal role in the pathogenesis of transplacental hemorrhage. Chown,[1-3] in his reported cases, confirmed Wiener's hypothesis by demonstrating the presence of fetal cells in the mother's blood. It is our purpose in this paper to describe a case of proved intrauterine transplacental hemorrhage which produced severe anemia in a newborn infant.

REPORT OF A CASE

A Caucasian female infant was born to a 21-year-old gravida II woman. There was one other sibling, 5 years old, in good health. The mother's pregnancy had been uncomplicated except for a severe fall in her fourth month. At that time she had injured her back and had had chills and fever on the following day. She had recovered without any treatment except rest, and progressed normally in her pregnancy until 2 weeks before term, when she fell again. This second fall resulted in bruised knees, but there were no systemic symptoms accompanying this episode. Hematocrit levels were 31% at the 4th and 8th months of the prenatal period. At the time of hospital admission, the mother's hemoglobin was 14.1 Gm. and the hematocrit was 46%. She was group O, CDe/CDe.

The delivery of the infant was uneventful and labor lasted approximately 5 hr. The membranes ruptured spontaneously 1 hr before delivery. A median episiotomy was performed by the attending physician. Forceps were not used. There was no evidence of placenta praevia, abruptio placentae, or tearing of the umbilical vessels. The obstetrician, after examining the placenta, considered it to be grossly normal and discarded it. There was no excessive bleeding during delivery. At birth the baby breathed spontaneously, but was noted to be pale.

The infant was seen by one of us within ½ hr. after birth. The child was pale, limp, responded poorly to stimuli, and appeared to be in shock. The heart rate was 120/min., the spleen was palpable two finger-breadths below the left costal margin, and the abdomen was soft. There was no evidence of hepatomegaly, intra-abdominal hemorrhage, edema, jaundice, or heart murmur.

Laboratory findings. The baby girl was group O, CDe/cde. Initial hemoglobin performed on the cord blood was 4.6 Gm., the hematocrit was 13.5, the total bilirubin was 0.8 Gm. per 100 ml., and the direct Coombs test was negative. The child's hemoglobin was 4.4 Gm. per 100 ml., hematocrit was 13.5, and the corrected white blood cell count was 29,140 per cu. mm. Thirty-one normoblasts per 100 leukocytes were seen in the stained peripheral smear. There was a

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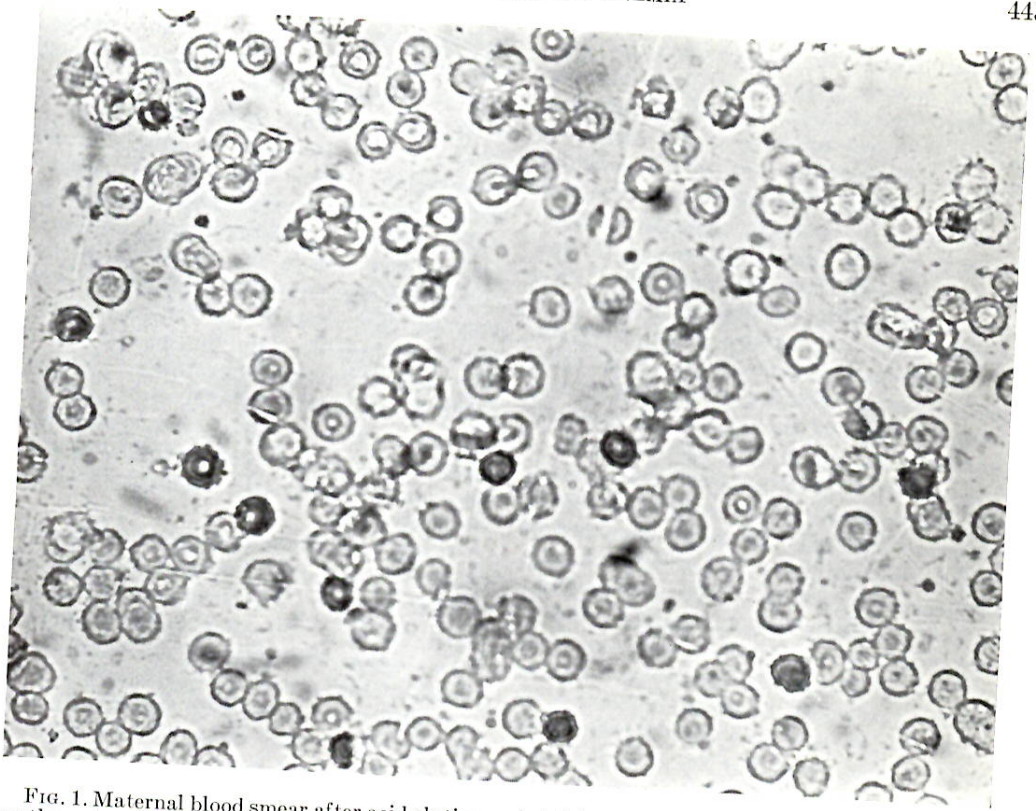

FIG. 1. Maternal blood smear after acid elution and staining with hematoxylin and eosin. The fetal erythrocytes are dark and refractile. × 400.

reticulocytosis of 16.3%, platelets were 241,000 per cu. mm., and the erythrocytes were hypochromic and normocytic.

The maternal serum was tested against a pool of reagent red cells (Hemantigen, Pfizer) and no antibodies were found. Because the mother was homozygous for C and the baby was heterozygous for c, the possibility of maternal sensitization to c factor had to be considered. The mother's blood did not agglutinate erythrocytes containing the c antigen (Fig. 1).

As soon as the baby had been examined, the umbilical vein was cannulated and an infusion of Ionosol B (a mixture of polyionic electrolyte solution) was given until the necessary blood was crossmatched. Approximately 1 hr. after delivery, the infant received 75 ml. of group O, Rh negative blood. The child's skin color immediately became pink and the respirations, which had been increased, returned to normal and her general condition improved dramatically. The hemoglobin rose to 8.3 Gm. per 100 ml.

The child received a second transfusion of 75 ml. of group O, Rh negative blood, 18 hr. after delivery. The hemoglobin was then elevated to 13.2 Gm. By the fourth day after delivery, the hemoglobin level had reached 15.9 Gm., the reticulocyte count had dropped to 7.6%, and only 1 normoblast was evident in the blood smear. The bilirubin never exceeded 1.6 mg., and at no time during the hospital stay did the infant show signs of jaundice. The child ate well, had normal stools, and appeared to be completely healthy at the time of discharge on the 8th hospital day.

Hematologic studies on the baby 60 days after birth showed the hemoglobin to be 9.6 Gm. per 100 ml., the hematocrit 28, and the reticulocyte count 2.2%.

COMMENT

The anemia in our patient was not due to intravascular hemolysis. We eliminated sero-

by intrinsic degeneration or traumatic rupture. The recent observation of Cohen,[4] demonstrating the presence of fetal cells in the mother's blood, has emphasized the existence of fetomaternal leaks. This investigator found fetal red cells in increasing frequency during pregnancy and in the immediate postpartum period in 50% of the ABO compatible pregnancies without Rh sensitization. The pathogenesis of the anemia in our patient might be due to an exaggeration of the mechanism by which fetal cells frequently transcend the placental barrier. Less severe instances of neonatal nonhemolytic anemia due to placental leaks, in which shock does not occur and in which transfusions are not required, could be unrecognized cases of transplacental hemorrhage. The destruction of fetal cells by homologous agglutinins in the ABO system would make the recognition of fetal cells in the mother's blood difficult or impossible in heterospecific pregnancy. We think that transplacental hemorrhage should be considered as a possible cause of nonhemolytic anemia in the newborn where overt placental bleeding is not evident. In addition, intrauterine transfusion may be responsible for some examples of otherwise unexplained anemia seen during the first 6 months of infancy.

There was nothing in the mother's history to suggest an untoward reaction to the transplacental transfusion of which she was the recipient. The similarity of the antigenic structure of the erythrocytes and the facts that the mother's serum did not agglutinate the infant's red cells and that no antibodies were demonstrated in the mother's serum precluded that possibility in these circumstances. The only incidents in the mother's history that could be incriminated as having a causal or aggravating influence in the pathogenesis of the functionally significant fetomaternal leaks were the two severe falls that she experienced during pregnancy. Intrauterine stress or inapparent morphologic alterations on a traumatic basis could have augmented the physiologic mechanism of placental passage of red cells.

SUMMARY

A newborn infant presented with profound anemia and shock. There was no evidence of intravascular hemolysis, abnormal bleeding during delivery, or hemorrhage relating to placental abnormalities. The placenta was grossly normal. The mother and child had compatible bloods and there was no demonstrable incompatible maternal antibody. The child's anemia was due to protracted transplacental hemorrhage. The latter premise was proved by demonstrating 4.5% of the red cells and 4.7% of the hemoglobin in the mother's circulation to be of fetal origin. The pathogenesis of the occult hemorrhage is not known. It may, however, represent an extreme example of the recently recognized fetomaternal leaks seen in a significant number of pregnant women. The anemia was treated successfully by two separate transfusions of blood.

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