Broadly speaking, diabetics may belong to the entirely insulin-deficient group, in which the onset is usually before maturity, or to a group in which insulin might be sufficient but becomes ineffective owing to the excess of any of a number of hyperglycaemic factors (pituitary, adrenal, glucagon) or to defective storage or release of liver glycogen.

Tropical diabetes appears to be related to liver conditions that disturb the storage and release mechanism of glycogen.

Summary

The pattern of diabetes mellitus in East Pakistan is shown, based on the study of 894 cases in the Medical Research Centre under the auspices of the Pakistan Medical Research Council and the Diabetic Association of Pakistan. They are classified into "tropical diabetes," type 1 and type 2 of Lawrence, and type J of Hugh-Jones. The characteristic features of tropical diabetes, such as infrequency of ketonuria, acidosis, rarity of diabetic coma, and effective therapeutic response with oral hypoglycaemic tablets, are stressed. Relevant literature on diabetes is reviewed and the present conceptions regarding its aetiology and pathogenesis are considered. Diabetes is due either to insulin deficiency or insulin ineffectiveness as a result of overactivity of hyperglycaemic factors such as pituitary, adrenal, and glucagon. It may also be due to obesity and defective storage and release mechanism of liver glycogen. Although biological assay of insulin has not been done, clinical and therapeutic evidence suggests that "tropical diabetes" does not belong to the group entirely deficient in insulin, and that insulin ineffectiveness seems to be related to liver disease due to dietetic, hygienic, or ecological factors. Tropical diabetes may thus be caused by a defect in the storage or release of liver glycogen rather than deficient secretion of insulin. The need for properly controlled and well-organized research on these diabetics is stressed.

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To help instructors in teaching the "mouth-to-mouth" and "mouth-to-nose" methods of artificial respiration a new film strip has been prepared by the National Dock Labour Board in conjunction with the St. John Ambulance Association. The strip, which has 16 frames and is entitled "Respiratory Resuscitation," has been accepted by the St. Andrew's Ambulance Association and the British Red Cross Society, and lecture notes are supplied. Both strip and lecture notes are based on the new supplement to the *First Aid Manual* dealing with "mouth-to-mouth" resuscitation. The frames, which are numbered serially to correspond with the numbered paragraphs of the lecture notes, may be cut from the strip and mounted in 2 in. by 2 in. slides for use in projectors as separate transparencies. (From Secretary (Visual Aids Section), The St. John Ambulance Association, 10 Grosvenor Crescent, London S.W.1. Price 5s., post free.)

CASE OF FOETAL ANAEMIA DUE TO TRANSPLACENTAL BLEEDING SEEN IN GENERAL PRACTICE

BY

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An unexpected complication of an otherwise apparently routine domiciliary obstetric booking which occurred in practice prompts this article. I wonder how often lesser degrees of foetal anaemia, other than cases due to rhesus or other blood-group incompatibility, go unnoticed.

Of all cases of anaemia in the newborn 95% are due to haemolytic anaemia of incompatibility of one sort or another (Rh, ABO, Kell, Duffy, etc.). In the other 5% the anaemias are non-haemolytic; very rarely, they may be due to syphilis or other infections, leukaemia, or neoplasm. The majority are due to neonatal or prenatal haemorrhage (Colebatch *et al.*, 1956). Possible causes as listed by Colebatch are: (1) Haemorrhage due to trauma or from the cord soon after birth. (2) Haemorrhagic disease of the newborn. (3) Placenta praevia, vasa praevia, and other anatomical abnormalities of the placenta, and placental incision during caesarean section. (4) Premature separation of the placenta (abruptio placentae); accidental haemorrhage. (5) Rupture of the cord. (6) Occult bleeding from foetal part of placenta. (I would add here damage to the placenta from high rupture of the membranes during Drew Smythe catheterization, as described in one case by Apley *et al.* (1961).)

Wiener (1948) theorized that some cases of foetal non-haemolytic anaemia might be due to "unapparent haemorrhage from the foetal surface of the placenta into the mother's circulation" and described three cases but without definite serological proof of his hypothesis. Chown (1954) was the first to describe a technique using differential agglutination proving Wiener's theory, though others had described cases which must have had the same cause. Since then Zipursky *et al.* (1959) have described a different technique using acid buffer that does not affect foetal cells but, after staining, leaves adult erythrocytes which appear as "ghosts." This was an adaptation of an observation by Kleihauer *et al.* (1957).

Many cases have been described, but none that can be traced occurred in domiciliary practice, nor did any of the neonates seem to have the degree of anaemia shown in the case described below.

Case Report

The patient was a para-3, gravida-4 aged 25. In her first pregnancy labour had been normal, and the second was complicated only by a very mild toxemia terminating in a spontaneous normal delivery. The third pregnancy, terminating 16 months previously, had been complicated by painful colicky contractions of the uterus in the last month, and to relieve her of these the membranes were ruptured by Drew Smythe catheterization two days after term, the cervix being ripe. Labour ensued in 36 hours and was normal, though the infant had atelectasis of an upper lobe which resolved with antibiotic cover. The expected date

of delivery in the fourth pregnancy was March 19, 1961, and the pregnancy was apparently completely normal apart from a cough strain of the intercostal muscles at the seventh month. The mother's haemoglobin in the mid-trimester was 80% (11.9 g./100 ml.).

In the last month the mother again had colicky uterine contractions and was rather tired (the other children were then aged 6 years, 4 years, and 16 months). On two occasions she called the nurses as she thought she had gone into labour ("false alarms"). To relieve her, 10 days before the E.D.D., the cervix being ripe and the head over the brim, medical induction (oil, bath enema, and intramuscular "pitocin," four doses of 2.5 units at hourly intervals) was tried. Regular painful contractions ensued, but these passed off in a few hours. On March 20 Drew Smythe catheterization was performed and clear liquor withdrawn. She failed to go into labour in 48 hours and medical induction with a further four half-hourly doses of pitocin 2.5 units was ordered. She was fully dilated at 6.45 p.m. on March 22 and was spontaneously and normally delivered by the district midwives five minutes later.

The third stage lasted 20 minutes and at no time was there any abnormal vaginal blood loss. The infant, a female, birth weight 7 lb. 4 oz. (3,290 g.), cried immediately. The placenta and membranes were described as normal but had been destroyed before my arrival 20 minutes later. At that time it was noted that the infant was extremely pale and cold though of normal alertness, and crying. She was taken at once to the laboratory of the Essex County Hospital, where full haematological investigation was performed.

Blood Picture

Mother.—She was group O Rh-positive and in none of her pregnancies, including the present, were antibodies found at the 34th week.

Baby (one hour after birth; heel-prick.—Hb, 25% (3.7 g./100 ml.) (British standard)—normal range 15.4–22.8 g./100 ml. (at birth) (Mollison, 1951). Colour index, 1.4. Red blood cells, 900,000/c.mm. Packed cell volume, 15%. Mean corpuscular volume, 167 cubic microns. Mean corpuscular haemoglobin concentration, 25%. Cord bilirubin, 0.2 mg./100 ml. (normal 0.1–0.25 mg./100 ml.). Group O Rh negative. Direct Coombs test negative. Total leucocytes, 26,000/c.mm. (neutrophils 33%, lymphocytes 37%, eosinophils 9%, monocytes 9%, basophils 2%, metamyelocytes 6%, neutrophil myelocytes 3%, premyelocytes 1%). Total nucleated cells, 70,400/c.mm. Total nucleated red blood cells, 44,400/c.mm. (145 late, 25 intermediate, and 1 early normoblast seen in counting 100 white blood cells).

The baby was transferred to the paediatric unit at the Chelmsford and Essex Hospital under the care of Dr. Charles Warren. On admission she was still in reasonably good condition. There were no petechiae, the spleen was not palpable, and the liver edge was 1½–2 fingerbreadths below the right costal margin. An exchange transfusion of 600 ml. of group O Rh-negative blood was given over a period of two and a quarter hours. After this the Hb was 90% (13.3 g./100 ml.) and serum bilirubin was 0.3 mg./100 ml.; six hours later the latter was 0.7 mg./100 ml. There was a brief episode of peripheral cyanosis later in the day but otherwise the rest of the neonatal period was normal.

The child was discharged from hospital on the second day. She thrived, and on the 27th day her haemoglobin was 72% (10.7 g./100 ml.) and reticulocytes 0.6% were present. At the third month her Hb was 79% (11.7 g./100 ml.).

Samples of the mother's blood were taken shortly after the birth and sent to the North-East Metropolitan Regional Blood Transfusion Centre at Brentwood, Essex. I am indebted to the director, Dr. W. J. Jenkins, and to Dr. Koster for permission to quote from their report: *Infant*: Group O $\bar{c}\bar{d}\bar{e}/\bar{c}\bar{d}\bar{e}$ P₁ neg. M pos. N neg. S pos. $\bar{s}$ neg.

Direct Coombs test negative. *Mother*: Group O probable genotype $\bar{C}\bar{D}\bar{E}/\bar{c}\bar{d}\bar{e}$ R₁r P₁ pos. M pos. N neg. S pos. $\bar{s}$ neg.

The baby therefore had no antigens that the mother did not possess, and so it was not possible to detect the infant's cells in the maternal circulation by direct agglutination. Two other methods were tried. (1) The mother's blood was agglutinated with anti-D. The resultant supernatant free cell suspension was largely infant's blood shown by (a) characteristic reaction of foetal haemoglobin in the presence of alkali, and (b) characteristic reaction of cord cells with anti-i serum. (2) Maternal blood was treated with very dilute anti-i serum (Marsh, 1961). The resultant agglutinated cells were separated, washed free of antibodies, giving the same results as described above, and, in addition, the free cells did not react with antisera against antigens possessed by the mother but not by the baby.

The conclusion reached was that about 6% of the cells circulating in the mother were from the infant—that is, that the baby had bled into the mother. It should be noted that at no time did the mother show any recognizable reaction to the transfusion from her child.

Discussion

It was thought that the colicky uterine contractions and two medical inductions with pitocin might have ruptured foetal vessels in the placenta with resultant bleeding into the maternal circulation. None of the other possible causes listed by Colebatch *et al.* were present. The finding that 6% of the red cells in the mother's circulation were of foetal origin indicated that approximately 400 ml. of blood was lost by the baby. As a full-term neonate's blood volume is between 200 and 300 ml. it must be concluded that the child had bled slowly into the mother. The very large number of nucleated red cells in the infant's blood at the time of birth supports this contention, though this is not so conclusive, as this response may take place within 48 hours.

Summary

A case of transplacental bleeding from foetus to mother is described. At birth the infant's haemoglobin was 25% (3.7 g./100 ml.) (British standard). There were no signs of haemorrhage in mother or child at any time, nor were any factors present to cause haemolysis of the infant's blood. It is suggested that medical induction with pitocin in the presence of a hypertonic uterus caused the baby to bleed into her mother. 6% of the red blood cells circulating in the mother were of foetal origin.

I am indebted to the pathological department at the Essex County Hospital, Colchester, and to the North-East Metropolitan Regional Blood Transfusion Centre for help with the laboratory details of this article. I also thank Dr. C. B. M. Warren and the staff of the paediatric department at St. John's Hospital, Chelmsford, for their assistance with this case.

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