SIGNIFICANCE OF RESUS SENSITIZATION IN PREGNANCY

by

D. S. Chaturvedi, M.Sc.

and

Gauri Bazaz Malik, M.D., F.R.C. Path (Lond), F.C.A.I.

Introduction

The discovery of Rhesus factor (Rh) by Landsteiner and Weiner (1940) initiated a revolutionary phase in the history of human blood groups. In modern time Rh has become important to all those who use blood transfusion as a therapeutic measure, particularly so to an obstetrician dealing with a sensitized mother. An early induction of labour may result in a premature unaffected baby exposed to risk due to prematurity and allowing the pregnancy to proceed till term may result in a severaly affected neonate. A study was therefore, carried out to find the significance of Rh (D) antibody in a Rh (D) sensitized patient.

Material and Methods

The study was carried out in the Blood Bank and transfusion unit of the pathology department of Lady Hardinge Medical College and Hospital, New Delhi. A total of 12,372 patients who had a bad obstetric history and were attending the antenatal clinic during their current pregnancy were investigated from 1968 to 1977. Out of these 992 (8.00%) were Rh (D) negative. These were investigated for Rh (D) antibodies employing saline and 22 per cent bovine albumin treated 0 Rh (D) positive red cells. Out of these 75 (7.6%) of the Rh (D) negative showing sensitization (0.62% of the total) showed Rh (D) antibodies and were followed throughout their course of pregnancy and repeated estimation of Rh (D) antibody titre was performed during the follow-up period. Genotype study was carried out in 31 out of 75 of these case. Ten male partners of Rhisoimmunised patients were also subjected to Genotype study. Cord blood was studied in 53 Rhisoimmunised neonates for ABO and Rh (D) grouping, Direct Coomb's test (Bhatia 1977) and serum billirubin (King and Wooten 1959) also were done.

The blood samples were collected from the vein of the patients and cord bloods were collected from placental end of umbilical cord from Rhisoimmunised neonates at the time of birth. In cases where cord blood could not be collected at the time of birth, blood samples were collected from femoral vein of neonates. The qualitative and quantitive estimation of Rh (D) antibodies were done according to techniques advocated by Bhatia (1977)—Haemoglobin estimation of cord blood was done by Sahlis Haemoglobinometer.

Observation

Out of a total of 12,372 cases studied, 992 patients were found to be Rh (D) negative, thus giving the incidence of Rh (D)

Department of Pathology & Blood Bank Unit, Lady Hardinge Medical College and Hospital, New Delhi.

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negative of 8.00%. The incidence of Rh negative on the basis of religion was Mohammedons 40 out of 303, Hindus 892 out of 11,128, and Sikhs 60 out of 918, thus giving an incidence of 13.2% in Mohammedons, followed by 8.4% in Hindus and 6.6% in Sikhs. Rh(D) antibodies were found in 75 out of 992 Rh negative cases out of a total of 12,372 in this study, thus giving the incidence of Rh immunization of pregnant mothers as 0.6% total cases studied and 7.6% of Rh negative cases studied. Genotype homozygous for the factor Rh (D) was found in 31 immunized cases, while 10 male partners of Rhisosensited females showed a range of 40% hetrozygous and 60% homozygous and Direct Coomb's test on cord bloods of all the 53 cases (100%) was found to be positive.

Cord blood studies could be done only in 53 neonates born of 75 Rhisoimmunised mothers (70%). Cord blood haemoglobin was found to be in the range of 10 to 12 g% in 3 cases, 12.1 to 13.5 g% in 3 cases, 13.6 to 15 g% in 9 cases and 15.1 to 21 g% in 38 cases. (Normal range 12.5 to 25 g% Gupte *et al*, 1972). Serum bilirubin in all the cases was above 1.6 mg%. The range of 1.6 to 3 mg% was seen in 21 cases, 3.1 to 4.9 mg% in 24 cases, 5 to 5.5 mg% in 2 cases and 5.6 to 6 mg% in 6 cases (Normal range for cord blood 0.6 to 2.8 mg% Gupte *et al*, 1972).

Discussion

Rh(D) blood grouping is an essential requisite for complete antenatal care. Since it is genetically transmitted, there is a great variation in different populations of the world. The antigen is absent in 15% of white population (Bhatia, 1977).

In coloured races in America, Rh (D) negative is found to be 5.8% Potter (1944). Various Indian workers have reported the incidence of Rh(D) negative from 0.6% to 10% in various Urban communities. Varying incidence might be due to type of population studied. In present study an incidence of 8.00% was obtained which is comparable with that of Greval and Roy Chaudhry (1946) 8% Ranganathan *et al* (1948), 8.5% Venkatramiah and Krishna Rao (1953) 8% and Shiv Raman *et al* (1971) 8.7%. The incidence of Rhisoimmunization has been reported to be 5.6% by Donohue (1954), 5.00% by Potter (1958), and 6.40% by McElin (1962). These reported for India are (6.2% by Sheth *et al* (1964) 1.40% by Trivedi *et al* (1968) 1 in 50 Rh negative women in second pregnancy, 1 in 9 amongst Rh negative women with 4 or more previous pregnancies. Mehta *et al* (1976) and 1 out of every 30 Rh negative cases Bhatia (1977). In present study, 75 out of 992 Rh(D) negative cases had demonstrable antibodies which gives an incidence of 7.6% in Rh negative cases which is higher than the figures quoted by above authors except that of Mehta (1976). The underlying cause could be a selected study from cases who gave bad obstetric history. The obstetric details of these cases are given in Table I. Genotyping of 4 husbands were found to be hetrozygous, while 6 were homozygous. Incidence reported at Queen's Charlotte's Hospital (London) was 39% hetrozygous and 61% homozygous Trivedi and Purandare (1968). Relationship between maternal antibody titre and foetal outcome is a subject of controversy. Frish and Jackets (1949) reported that antibody titre of 1:4 did imply haemolytic disease of the new born. Allen (1950) in his series noted that most of the infants from mothers

TABLE I

Obstetric details of test cases and foetal outcome

Age: 20-30 yrs. = 46, 30-40 yrs. = 28, 45 yrs. = 1.

Parity: Primi = 1, 2nd para = 10, 3rd para = 23, 4th para = 24, 5th para = 11, 6th para and above = 6.

Mode of delivery: Normal = 24, Premature = 14, L.S.C.S. = 6. Classical C. S. = 1, Twin delivery = 1, Vesicular mole = 2, Forcep delivery = 1, Face presentation = 1, Premature induction of labour = 6.

Stillbirth = 2, Abortions = 16.

Placental weight: 400 to 500 gms, = 41, 500 to 600 gms = 12.

Neonates: Sex. Female = 25, Male = 28.

Birth weight: 2000 to 2500 grams = 15, 2500 grams to 3000 gms = 14, 3001 and above = 14.

Replacement Transfusion: Given = 15, Not given = 38.

Foetal out come: Fatal = 11, Non fatal = 42.

with maternal antibody titre of less than 1:16. Likelihood of kernicterus and stillbirths increased with maternal titre of 1:64 and above. Weiner (1958) reported mortality rate of 12.2% with 1:4 titre and 72.2% with values above 1:64. Kelsal and Vos (1955) suggested that when the value of maternal titre is 1:64 or less the infant does not require any treatment while premature induction of labour should be considered when the titre exceeds 512. Premature labour was induced in 6 cases having titre value of 1:128 Table I. Walker *et al* (1957) reported critical level of 1:32 at which haemolytic diseases of the new born developes. McElin (1962) found no correlation. Derrick Tovey *et al* (1969) reported good correlation between the higher titre values and foetal outcome. Srinivasan and Bhatia (1972) suggested correlation in general of the severity with titre value but not absolute. The studies of Roberts *et al* (1963) and those of Shrinivasan and Bhatia (1973) do not support correlation of the severity with Rh titre. In the present study no absolute correlation was found with maternal titre. However, it was noticed that neonates had serum bilirubin level from 1.6 to 3.3 mg% with maternal titre values upto 1.8, 2.5 to 6 mg% with values upto 1:32 and 5 to 6 mg% when the maternal antibody titre level reached 1:128. In one patient with maternal titre of 1:512 the pregnancy resulted in abortion of 4 months. Cord blood haemoglobin in an infant may be a clue whether it has been subjected to haemolytic process. In the present study 6 neonates showed a range of haemoglobin from 10 to 13.5 g% and all the 6 developed deep jaundice with a serum bilirubin level of 2.5 to 6 mg%, while 9 infants showed a range of haemoglobin from 13.6 to 15 g% and 38 from 15.1 g% to 21 g% and jaundice was in all neonates with serum bilirubin level from 1.6 to 3.3 mg% and as such a direct correlation with haemoglobin and serum bilirubin was noticed. 15 neonates were given re-

placement transfusion. Allen *et al* (1959) observed that no single criteria is a deciding factor. But Bhatia (1977) pointed out definite relation of the severity of the disease with bilirubin concentration of cord blood. From this study following conclusion could be drawn that Rh(D) grouping should be done routinely for antenatal care, husband's Rh (D) grouping including genotype should be determined of all Rh(D) negative patients so that advise regarding prognosis of future pregnancy may be given. Estimation of Rh(D) antibodies should be done routinelly on all Rh(D) negative cases again to advise regarding future prognosis of the child. Direct Coomb's test positive less than 10 g% haemoglobin, and more than 3.3 mg% billirubin in case of a neonate born of a Rh (D) negative mother indicates a poor prognosis.

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