

Hemolytic Events in Rh Positive Neonates Born to Rh Negative Mothers

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Abstract

Background

One of the most important cause of severe neonatal hyperbilirubinemia is hemolysis including Rh incompatibility. The aim of this study was to assess the rate of hyperbilirubinemia due to hemolysis in Rh positive neonates born to Rh negative mothers.

Methods

In this retrospective study from March 1998 to February 2003, 60 icteric Rh positive newborns that were born to Rh negative mothers, were studied. The data of patients were gathered from questionnaires sheets.

Results

The rate of hemolysis due to Rh incompatibility was 18.3%. The mean age of mothers was 31.9 years (SD:4.6). The mean level of hemoglobin in these patients was significantly lower (P=0.009) and serum bilirubin levels higher than nonhemolytic icteric neonates (P=0.007).

The mean age of onset of jaundice in hemolytic neonates was 1.55 days (SD: 618) and in nonhemolytic patients 2.08 (SD:1.03) days. Exchange blood transfusion was performed for 23 neonates (38.3%). In 61.7% of cases no history of anti-D immunoglobulin given during pregnancy or at delivery was present.

Conclusion

Due to poor prenatal care consisting of inadequate provision of anti-D immunoglobulin in Rh negative mothers, sensitization to Rh antigen in our Rh negative mothers was considerably high.

Key words

Rh incompatibility, neonate, hemolysis, hyperbilirubinemia.

Introduction

Rh incompatibility can cause severe hyperbilirubinemia in neonates that may result in major morbidities including kernicterus.⁽¹⁾ It is prudent to know to what extent an Rh positive neonate born to an Rh negative mother is at risk to hemolysis.

In one study it was revealed that the rate of hemolysis and hyperbilirubinemia in Rh positive neonates born to Rh negative mothers was 4.8%.⁽²⁾ In other report by Urbaniak 0.83-1.5% of neonates who were at risk of Rh incompatibility had Rh hemolytic diseases of newborns.⁽³⁾

Also, another study performed by Serrano, revealed that 3.3% of neonates suffered from hemolysis due to Rh mismatch.⁽⁴⁾

Special attention to the importance of hyperbilirubinemia due to Rh hemolytic disease of neonates prompted us to evaluate the rate of

hemolysis in Rh positive neonates born to Rh negative mothers in our center.

Methods

A retrospective study performed in Ghaem and Imam Reza hospitals in Mashhad from March 1998 to February 2003 was done.

All required data was taken from questionnaires from records of 60 Rh positive neonates born to Rh negative mothers. Samples were chosen by random.

All icteric Rh positive neonates aged up to 28 days born to Rh negative mothers admitted to the pediatric ward of Ghaem and Imam Reza hospitals in Mashhad were included. Cases who suffered from any other cause of hemolysis including G6PD deficiency or ABO incompatibility were excluded. RH hemolysis was defined as jaundice in RH positive newborn

with positive direct coombes test ,was delivered from RH negative woman.

Data including age of onset of jaundice, serum bilirubin levels, the rate of hemoglobin, age and parity of mother, any history of abortion and taking of anti-D antibody during pregnancy and post delivery, the rate of positive direct and indirect coombes test, and the rate of exchange transfusion was collected and analyzed with Minitab and SPSS 11 software. Chi square and t-test were used. Confidence interval of 95% was calculated. P value <0.05 was considered significant.

Results

Most of the cases were males (65% vs. 35%) with a mean age of admission 4.6 days (SD: 2.48). Mean age of mothers was 28.4 years. It was 31.9 years in mothers with Coombs positive neonates (SD: 4.6) and 27.6 years in mothers with Coombs negative neonates (SD: 6.4). Direct Coombs test was positive in 11 of cases (18.3%) and was negative in 49 patients (81.7%).All of mothers of these coombs positive neonates did not received anti-D immunoglobulin. Serum bilirubin levels had significant difference in 2 groups (P= 0.007). It was detected that serum hemoglobin levels had significant differences (P= 0.006).Also, there was a significant difference between parity

of mothers in the 2 groups (P= 0.024) Our findings are shown in .

Discussion

We found that 18.3% of Rh positive icteric neonates born to Rh negative mothers suffered from Rh hemolytic disease with higher bilirubin and lower hemoglobin rates than nonhemolytic icteric cases.

According to the other reports 0.35- 4.8% of Rh positive newborns developed hemolysis in mothers whom were Rh negative.^(2,3,4,5,6,7) But nearly one seventh of cases are at risk.⁽⁸⁾

This difference can be related to the inadequate of receiving of anti-D antibodies during pregnancy or at delivery in our patients.

It is known that with growth of the fetus the chance of sensitization of the mother is heightened, peaking at delivery.⁽⁹⁾

Therefore, anti-D prescription during pregnancy (18 -34 weeks of gestation) and at delivery can reduce the chance of activation of the immune system of mothers against D antigen by killing those fetal red blood cells that reach the mother's circulatory system.^(10,11,12) Unfortunately most of our patients had not taken anti-D antibody at pregnancy or at delivery.

Also, the volume of received fetal red blood cells is another critical factor in stimulating of

Table1. Some clinical and laboratory data

	Group	Mean	SD
Age of onset of icterus in neonates (day)	Coombs negative	2.08	1.03
	Coombs positive	1.55	618
Serum bilirubin levels in neonates (mg/dl)	Coombs negative	22.1	4.2
	Coombs positive	26.6	6.68
Hemoglobin level (g/dl)	Coombs negative	15.5	2.6
	Combs positive	13	2.4
Parity of mothers	Coombs negative	2.2	1.15
	Coombs positive	2.9	1.3
Abortion rate of mothers	Coombs negative	0.43	0.84
	Coombs positive	2.9	1.3

mother's B cell response. So, inappropriate time of administration or inadequate dose of drug can be serious contributing factors of lack of effective immune prevention of hemolysis.

Mean hemoglobin in our cases was 13 g/dl. It was the same as another study.⁽¹³⁾ It is due to severity of hemolysis in these patients.

But mean serum bilirubin levels in our cases were higher. It may be a result of late seeking of medical care in our patients.

Rate of parity, abortion and mean age of mothers with hemolytic disease were higher than the nonhemolytic icteric group. These findings are related to raising the risk of sensitization to Rh antigen after each abortion in the mother. Also the chance of fetomaternal blood mixing after each pregnancy increases.

It seems that because of the hemolytic event, the mean age of jaundice is lower in these patients than those icteric neonates without hemolysis as our results revealed.

Conclusion

To lower the rate of hemolytic disease of neonates, antenatal care including administration of anti-D immunoglobulin should be considered at the appropriate time and with an adequate dose. Increase in parity and abortion both can raise the chance of Rh sensitization in Rh negative pregnant women.

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