OBSTETRICS

Fetal thrombocytopenia secondary to parvovirus infection

Maria Segata, MD; Rabih Chaoui, MD; Nahla Khalek, MD; Ray Bahado-Singh, MD; Michael J. Paidas, MD; Giancarlo Mari, MD

OBJECTIVE: The aim of this study was to determine the platelet count in fetuses undergoing cordocentesis for hydrops caused by parvovirus infection.

STUDY DESIGN: Fetal platelets were measured at cordocentesis in 11 pregnant women who underwent the procedure because of fetal ascites and/or hydrops caused by parvovirus infection. Thrombocytopenia was defined as mild (platelet count $< 150 \times 10^9$/L), moderate (platelet count $\leq 100 \times 10^9$/L), or severe (platelet count to $\leq 50 \times 10^9$/L). Paired Student *t* test was performed to compare the platelet count before and after the transfusion.

RESULTS: The fetuses underwent 20 cordocenteses. They were thrombocytopenic in 17 and anemic in 15 occasions. The platelet count was reduced after the transfusion ($P < .05$). Demises occurred after the first transfusion in 2 fetuses. The first occurred within 5 minutes from the procedure and the second within 24 hours. Both were attributed to exsanguination from the umbilical cord puncture site (platelet count 2 and 24×10^9/L, respectively).

CONCLUSION: Thrombocytopenia is common in fetuses with hydrops caused by parvovirus infection, and can cause exsanguination from the umbilical cord puncture site. We recommend platelet transfusion during cordocentesis when there is severe thrombocytopenia.

Key words: cordocentesis, fetal thrombocytopenia, hydrops, parvovirus infection

Cite this article as: Sergata M, Chaoui R, Khalek N, et al. Fetal thrombocytopenia secondary to parvovirus infection. Am J Obstet Gynecol 2007;196;61.e1-61.e4

Parvovirus B19 is a common infectious agent in human beings with a seroprevalence of 50-70% in adults[1] and affecting from 0.25-6% of susceptible pregnancies.[2] The transplacental transmission rate of infection has been estimated to occur between 25% and 33% although fetal infection is more frequent during the early second trimester.[3,4] This situation can lead to nonimmunologic fetal hydrops or fetal death, with a loss rate ranging from 4-16%.[4-6]

Fetal hydrops in parvovirus infection is primarily caused by severe anemia, in which the pathophysiologic mechanism is the suppression of erythroid precursors in bone marrow. Although hydrops in parvovirus infection will resolve spontaneously in 34% of cases,[7] the rate of resolution and prognosis can be improved with correction of fetal anemia.[7,8]

Parvovirus infection can also suppress the platelet precursors, although it is not known how many fetuses have thrombocytopenia develop as a result of exposure. This information is important, because if severe thrombocytopenia is present, it can cause fetal exsanguination during a cordocentesis performed for correction of fetal anemia. Therefore, a platelet transfusion should be performed whenever there is accompanying severe thrombocytopenia.

The objective of this study was to assess the platelet count in fetuses undergoing transfusions, because of anemia secondary to parvovirus infection.

Materials and Methods

Eleven pregnant women were referred to our centers because of fetal ascites and/or hydrops secondary to parvovirus exposure. Three fetuses had ascites, and 8 had frank hydrops. Clinical management was based on individual risk benefit assessment with the aim of preventing perinatal death in a high-risk situation. Accordingly, this report takes the form of a retrospective audit exempt from research ethics approval, as it was not designed or undertaken as a research study, nor was there any intention to do so. All data were acquired as part of routine clinical management, organized in a database, and reviewed. The institution review board was informed of this audit and gave its approval.

Diagnosis of parvovirus infection was carried out in all pregnancies by measurement of specific immunoglobin M serum levels in the mother. No polymerase chain reaction (PCR) study was performed.

To rule out fetal malformations and evaluate fetal hydrops, an ultrasound was performed on all women to assess the amniotic fluid and appropriate growth for gestational age. Hydrops was defined by the presence of fluid in 2 fetal cavities and/or subcutaneous

From the Department of Obstetrics and Gynecology, Universita' di Bologna, Italy (Dr Segata); the Department of Obstetrics and Gynecology, Charité University Hospital, Berlin, Germany (Dr Chaoui); the Department of Obstetrics and Gynecology, Wayne State University, Detroit, MI (Drs Khalek, Bahado-Singh, and Mari); and the Department of Obstetrics, Gynecology and Reproductive Sciences, The Yale Blood Center for Women and Children, New Haven, CT (Dr Paidas).

Received Feb. 10, 2006; revised June 17, 2006; accepted Aug. 8, 2006.

Reprints not available from authors.

0002-9378/$32.00

doi: 10.1016/j.ajog.2006.08.041

TABLE 1
Hematologic parameters of affected fetuses at the first cordocentesis and outcome

Patient number	Week of gestation	Ultrasound examination (first FBS ± IUT)	Invasive procedure	Time blood sample	Hb(g/dL)	Platelets ($\times 10^9$/L)	Final outcome
1	20.1	Ascites	FBS + IUT	B	2.5	NA	
				A	13.9	28	Good
2	22	Hydrops	FBS + IUT	B	3.9	NA	
				A	10.8	195	TOP
3	22	Hydrops	FBS + IUT	B	4.2	66	
				A	9.2	32	Good
4	23	Ascites	FBS + IUT	B	10.0	276	
				A	12.9	246	Good
5	21	Hydrops	FBS + IUT	B	1.0	24	
				A	9.1	17	IUD
6	23	Hydrops	FBS + IUT	B	3.3	100	
				A	6.1	NA	Good
7	27.6	Ascites	FBS + IUT	B	1.80	2	IUD
8	22	Hydrops	FBS + IUT	B	4.4	NA	
				A	8.9	69	Good
9	21	Hydrops	FBS + IUT	B	3.8	40	Good
10	25	Hydrops	FBS + IUT	B	10.7	113	Good
11	24	Hydrops	FBS + IUT	B	3.4	24	Good

A, hematologic values after IUT; *B*, hematologic values before IUT; *FBS*, fetal blood sampling; *IUD*, intrauterine death; *NA*, not available; *TOP*, termination of pregnancy caused by mirror syndrome.

edema. A cordocentesis was performed on all fetuses through the umbilical vein, at the placental insertion or in a free loop at the discretion of the operator. Fetal platelet count and hemoglobin were measured after cordocentesis, and fetuses found to have anemia were transfused with packed red blood cells (PRBC). The volume of the blood transfused was calculated according to the initial fetal hemoglobin levels and gestational age, as in cases of immune hydrops. No platelet transfusions were performed.

Fetal anemia was defined as follows: mild anemia when hemoglobin concentration ranged from 0.84-0.65 times the median for gestational age (MoM), moderate anemia when hemoglobin concentration was between 0.65 and 0.55 MoM, or severe anemia when hemoglobin concentration was less than 0.55 MoM.[9]

Doppler examination of the middle cerebral peak systolic velocity was not performed in all patients.[11]

Thrombocytopenia was defined as mild when platelet counts were less than 150×10^9/L, moderate with platelet counts less than or equal to 100×10^9/L, and severe with platelet counts less than or equal to 50 x 10^9/L.

Platelet counts obtained before transfusion were compared with platelet counts obtained after transfusion and the differences were evaluated by using a paired Student *t* test. $P < .05$ indicated statistical significance.

A "good" outcome was defined as infants born alive without neonatal complications caused by anemia or thrombocytopenia.

RESULTS

The mean gestational age at referral was 22.8 weeks with a range between 20.1 and 27.6 weeks. A total of 20 cordocenteses were performed, including 11 initial and 9 subsequent. Eight fetuses underwent 1 intrauterine transfusion, 2 fetuses underwent 2 intrauterine transfusions, and 1 fetus underwent 3 intrauterine transfusions (Tables 1 and 2). Six fetuses had moderate or severe anemia before the first transfusion. PRBC were used for the transfusions. On 5 occasions, the fetuses were nonanemic and they were not transfused.

The platelet count was evaluated in 8 fetuses before the first intrauterine transfusion (IUT): thrombocytopenia was mild in 1 fetus, moderate in 2, and severe in 4 others, whereas only 1 fetus had a normal platelet count, although mild anemia was also present in this 1 case. In 3 other fetuses, the platelet count was assessed after the first transfusion: 1 fetus had moderate thrombocytopenia, 1 severe thrombocytopenia, and the third had a normal platelet count (Table 1).

After the first transfusion, 9 subsequent cordocenteses were performed on 4 fetuses (Table 2).

Two fetal demises occurred. The first occurred during the cordocentesis