Prenatal Diagnosis of Hereditary Spherocytosis with Osmotic Fragility Test

Hereditary spherocytosis (HS) is a common inherited hemolytic anemia involving cell-membrane alterations. Its prevalence in Europe is approximately 1 in 2000; this ratio may be an underestimate since mild cases are often not diagnosed(1). Its clinical expression is hetero-geneous, ranging from severe transfusion-dependent anemia to clinically silent forms with well-compensated chronic hemolysis. Some patients can present with a very severe phenotype in early infancy. Well-defined criteria for diagnosis of HS at birth are not established. In fact, the disease is diagnosed in only one third of affected infants during the first year of life(2).

We want to share our experience about prenatal diagnosis of a HS patient by a very cheap and simple test, osmotic fragility. Prenatal diagnosis for HS is not recommended, as even severe forms of the disease can be cured by splenectomy especially after 5 years, but sometimes after 3 years if necessary(1,2).

Mother of a 3-year old girl patient of severe HS, had a new pregnancy. The child was on regular red cell transfusions. Both mother and father were otherwise healthy. During this pregnancy, mother was documented to have abnormal osmotic fragility test. The obstetrician decided to do cordocentesis at 18 weeks of gestation. We were asked whether a prenatal study for fetal membrane protein deficiency could be done from the cordocentesis material. Due to financial and logistic constraints, this was not possible. We decided to study osmotic fragility with the blood taken. The reduced surface area-volume ratio characteristic of spherocytes increases their susceptibility to osmotic lysis in hypotonic solutions. This is the basis of osmotic fragility test, in which red cells are suspended in buffered salt solutions of decreasing tonicity and the degree of hemolysis is determined(1).

The membrane of fetal erythrocyte differ from that of adult(3,4). Although the protein ingredients of membrane difference is observed, the functional significance of these observation is not known. We could find little literature related to osmotic fragility of fetal erythrocytes and pregnant women(5,6). After finding a curve which supports the diagnosis of HS of the fetus, we decided to make a control group consisting of 18-20 week old fetuses in whom cordocentesis was done for reasons other than suspected hematological diseases. We studied osmotic fragility test of 10 fetuses. All of their curves were found in normal range.

After we found that the probability of fetus suffering HS was high, we talked to the family. They gave up the idea of abortion and decided to continue the pregnancy. The offspring was a healthy boy, who was diagnosed with HS, but never requiring red cell transfusions even though his hemoglobin was 7.5 g/dL when he was 2 months old. He is now 13 months old with no complaints except a mild anemia (9.8 g/dL).

We never recommend routine prenatal diagnosis of HS, but our experience showed that osmotic fragility may be an alternative test to determine who needs more detailed, complicated and expensive diagnostic procedures for families with severe HS. In future, we also plan to perform osmotic fragility test of the mother at the same time with the fetus to rule out the possibility of any contamination of fetal blood with maternal blood, as maternal erythrocytes can show increased osmotic fragility during pregnancy. The comparison of osmotic fragility patterns of the mother and the fetus and finding different values, even mother was a HS patient, would identify this problematic issue.

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