# HEREDITARY SPHEROCYTOSIS IN MOTHER AND NEONATE DIAGNOSED BY ANEMIA AND HYPERBILIRUBINEMIA IN THE NEONATE

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*Abstract* : We experienced a case of hereditary spherocytosis in both mother and neonate diagnosed by anemia and hyperbilirubinemia in the neonate. Phototherapy was effective against the neonatal jaundice ; however, anemia became severe and necessitated a blood transfusion. The mother had been diagnosed with hemolytic anemia, cholelithiasis, and splenomegaly at the age of 20 and had a cholecystectomy and splenectomy with no follow-up thereafter. There was no advance of the anemia nor hemolytic crisis during the pregnancy ; however, LDH and total bilirubin increased in the last stage of pregnancy. With hereditary spherocytosis in mother, perinatal health care management is required for her, as well as for the neonate who may well have anemia and hyperbilirubinemia.

**Key words** : hereditary spherocytosis, pregnancy, anemia, MCHC, neonatal jaundice

## INTRODUCTION

Hereditary spherocytosis (HS) is a congenital hemolytic anemia caused mainly by autosomal dominant inheritance. Pathologic hemolysis can be compensated for by transfusion to avoid anemia. Major symptoms include jaundice, cholelithiasis, and splenomegaly. In a pregnancy complicated by HS, it is important to carefully observe and treat a hemolytic crisis in the mother and jaundice in the neonate[1,2]. This report describes our experience of HS in both a mother and a neonate, who was also diagnosed with anemia and hyperbilirubinemia.

## CASE REPORT

The patient was a 30-year-old primigravida at 24 weeks and 4 days pregnancy when first examined at our hospital. She had been diagnosed with hemolytic anemia, cholelithiasis, and splenomegaly at the age of 20, and had a cholecystectomy and splenectomy. The patient had not been followed up thereafter. There was no particular family history. The patient did not have anemia during the pregnancy. Onset of labor occurred at 37 weeks and 5 days pregnancy, resulting in normal vaginal delivery with 280g of hemorrhage at delivery and 480g of placenta.

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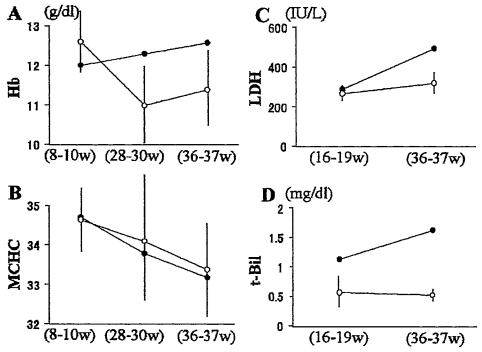


Fig. 1. Comparison of patient with normal pregnant women in some parameters.
Hb: hemoglobin, MCHC: mean corpuscular hemoglobin concentration, LDH: lactate dehydrogenase, t-Bil: total bilirubin; closed circle: this patient, open circle: primipara women without complication who delivered at 30 or 31 years old in the same year at our hospital (n=19, average ± SD).

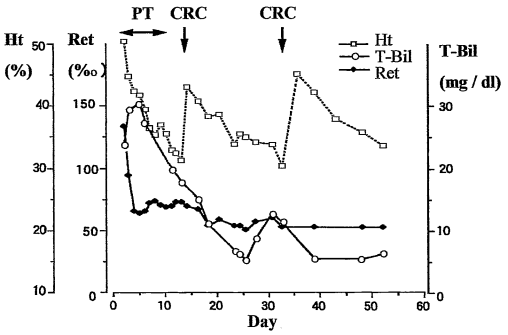


Fig. 2. Clinical course of the neonate.
PT: phototherapy, CRC: concentrated human red cell, Ht: hematocrit, Ret: reticulocyte, T-Bil: total bilirubin.

The patient's changes in hemoglobin, MCHC, LDH, and total bilirubin during the pregnancy were compared with the average of a control group of 19 Japanese primipara women. They had delivered without complication at 30 or 31 years of age at our hospital in the same year (Fig. 1). Total bilirubin and LDH at 37 weeks pregnancy increased to 1.64(mg/dl) and 500(IU/l), respectively. Hb did not fall as compared with the control group and MCHC decreased, as with the control group. The mother made satisfactory progress after the delivery.

The neonate weighed 2630 g at birth and had an Apgar score of 9. The neonate was treated with phototherapy for high total bilirubin (25.93 mg/dl) on day two. Blood transfusions were given as needed using concentrated human red blood cells (CRC): 40 ml on day 13 and 50 ml on day 34. Fig. 2 shows the clinical course of the neonate.

The mother and neonate were examined in detail because of her history of hemolytic anemia. Both had an A/Rh+ blood type. Direct and indirect Coombs' tests were negative.

The maximum values in an erythro-resistant test (Sanford method) were higher than the reference value in both mother and neonate, indicating a reduction of erythrocyte osmotic

Table 1. Erythrocyte-resistant test (Stanford method).

| | Mother's blood | Neonate's blood | Standard level |
|---|---|---|---|
| Minimum resistance (%) | 0.64< | 0.64< | 0.44−0.42 |
| Maximum resistance (%) | 0.42 | 0.44 | 0.34−0.32 |

Maximum resistance values of both mother and neonate were higher than the standard level, showing the decrease of erythrocyte osmotic resistance.

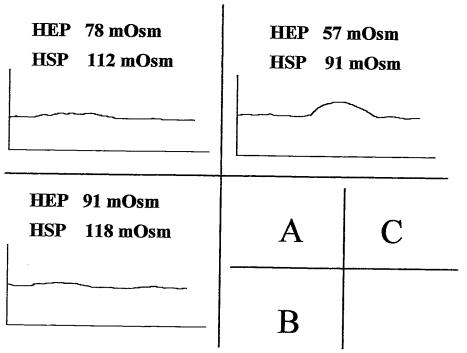


Fig. 3. Changes of hemolysis starting point (HES) and hemolysis end-point (HSP).
A: patient's blood, B: neonate's blood, C: normal adult's blood
HEP and HSP move to hypertonic osmotic pressure, showing a decrease of osmotic resistance of erythrocyte in both A and B.

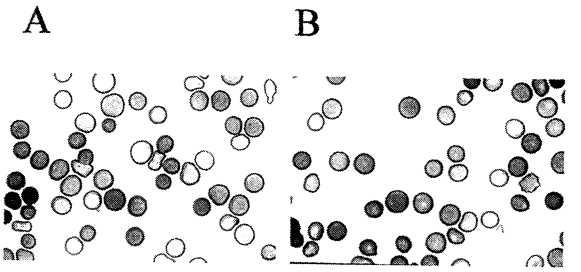


Fig. 4. Peripheral blood smears of the patient and the neonate.
A: patient's blood, B: neonate's blood
Small spherocytes are observed in both A and B.

resistance (Table I). In dynamic utilizing coil-planet centrifuge, the minimum and maximum resistance values (hemolysis end point (HEP) and hemolysis starting point (HSP), respectively) of both mother and neonate moved to show hypertonic osmotic pressure, showing a decrease of the osmotic resistance of the erythrocyte membrane (the dynamic osmotic fragility of erythrocytes) (Fig. 3). Peripheral smears of the mother and neonate indicated small spherocytes (Fig. 4).

Based on these findings, the mother and neonate were diagnosed with HS.

## DISCUSSION

HS is a congenital hemolytic anemia caused mainly by autosomal dominant inheritance. In the present case, hemolytic anemia was observed in mother and neonate, so that autosomal recessive inheritance or inheritance may not be proven in this case.

The major symptoms of this disease are jaundice, cholelithiasis, and splenomegaly. Pathologic hemolysis can be compensated for with a transfusion to avoid anemia. In this disease, erythrocyte destruction of the spleen is greater because of an abnormality of erythrocyte membrane proteins. More than 70% of adult patients with this disease have splenomegaly, with splenectomy being a highly effective treatment for this disease. Cholecystectomy may be combined with splenectomy because cholelithiasis often develops. In the present case, these operations had already been performed and HS was in remission.

As compared with patients who have received splenectomy and whose HS has been remitted, patients who do not have a splenectomy generally need careful management focusing on cholelithiasis, hemolytic crisis, aplastic crisis, and megaloblastic crisis during pregnancy[1,2].

Diseases with spherocytes other than HS include blood type incompatible pregnancy and

autoimmune hemolytic anemia. HS at neonatal stage is difficult to diagnose because cholelithiasis and splenomegaly are not observed and spherocyte is not typical at this stage[3].

In HS, severe anemia rarely develops during the fetal period, so treatment of neonatal jaundice is important. Indirect bilirubin often increases and it may be prolonged in neonates with HS because of greater hemolysis[4]. However, splenectomy is generally performed at 6 years old or later because the spleen is a lymphatic organ during infancy, thus a splenectomy may result in an immunocompromised host[5]. Basic treatment of neonatal jaundice consists of phototherapy and exchange blood transfusion. Some patients are resistant to phototherapy; however, it is rare for severe anemia to require blood transfusion[4]. Phototherapy was effective in the present case, although anemia became severe and a blood transfusion was needed. The mother did not show any advancement of anemia nor a hemolytic crisis, but LDH and total bilirubin increased in the late stage of pregnancy. It was unclear whether or not these elevations were relevant to hemolysis, splenectomy, or biliary system. In hereditary spherocytosis in mother, perinatal management is required to cover the health care of the mother as well as the treatment of neonatal anemia and hyperbilirubinemia.

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