



Value of serum TORCH-specific antibody detection in assessment of neonatal jaundice

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ABSTRACT

Objective: To study the value of serum TORCH-specific antibody detection in assessment of neonatal jaundice. **Methods:** A total of 70 cases of children with neonatal jaundice were selected as jaundice group, 70 cases of healthy newborn were the control group, and serum TORCH-specific antibody content as well as heart function, liver function, kidney function and nerve function indicators were detected. **Results:** Serum TOX-IgM, RV-IgM, CMV-IgM and HSV-IgM positive rate and content of jaundice group were significantly higher than those of control group; serum CK-MB, cTnI, AST, ALT, Cys-C, RBP, MBP, S100 β and NSE content of TORCH-positive children were significantly higher than those of TORCH-negative children, and BDNF, NT-3, NT-4 and NGF content were significantly lower than those of TORCH-negative children; T1WI signal of pallidum MRI of TORCH-positive children was significantly higher than that of TORCH-negative children. **Conclusions:** Serum TORCH-specific antibodies significantly increase in children with neonatal jaundice and can assess the degree of bilirubin metabolism disorder and the degree of target organ damage.

1. Introduction

TORCH is the abbreviation of toxoplasma gondii (TOX), rubella virus (RV), cytomegalovirus (CMV) and herpes simplex virus (HSV) and other pathogenic microorganisms (Other). After infecting the newborn, these pathogenic microorganisms can cause multiple organ damage, of which hyperbilirubinemia is with the highest incidence[1]. The occurrence of hyperbilirubinemia is caused by abnormal metabolism of bilirubin, bilirubin generation is excessive and the discharge reduces, which causes the excessive accumulation of bilirubin in the body, characterized by jaundice and multiple organ damage. TORCH infection will activate the body's immune system and produce specific antibodies, and the content of serum TORCH-specific antibodies can assess the severity of pathogen infection, and then provide evidence for the severity of jaundice and the degree of organ damage. In the following research, the value

of serum TORCH-specific antibody detection in assessment of neonatal jaundice was analyzed.

2. Materials and methods

2.1. Case information

The cases were selected from the children born in Obstetrics Department of our hospital from June 2013 to October 2015, including 70 cases of children who met with the diagnostic criteria for neonatal jaundice and 70 cases of healthy newborn who were included in jaundice group and control group respectively. Jaundice group included 37 male cases and 33 female cases, the gestational age was (37.2 \pm 4.1) weeks, and the age was (8.5 \pm 0.9) d; control group included 35 male cases and 35 female cases, the gestational age was (37.8 \pm 3.8) weeks, and the age was (9.1 \pm 1.0) d. Comparison of general information showed no differences between two groups.

2.2. TORCH-specific antibody detection

Chemiluminescence immune detection system and supplementary

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Table 4

Effect of different TORCH infection on nerve function indicators.

Groups	Nerve function injury molecules			Nerve function protection molecules			
	MBP ($\mu\text{g/L}$)	S100 β ($\mu\text{g/L}$)	NSE ($\mu\text{g/L}$)	BDNF ($\mu\text{g/L}$)	NT-3 (pg/L)	NT-4 (pg/L)	NGF ($\mu\text{g/L}$)
TORCH-positive	52.4 \pm 6.2	103.5 \pm 12.6	78.4 \pm 8.5	42.5 \pm 6.1	77.4 \pm 8.9	59.3 \pm 6.7	52.5 \pm 7.1
TORCH-negative	33.7 \pm 4.1	44.2 \pm 5.3	34.7 \pm 4.6	89.3 \pm 10.1	178.4 \pm 20.6	124.2 \pm 13.9	98.4 \pm 9.1
<i>t</i>	8.193	13.276	11.465	10.782	12.966	11.336	8.874
<i>P</i>	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

4. Discussion

TORCH infection is a common infectious disease of neonatal period, and as the immune system is not yet mature and the ability to resist infection is weak, the newborn are prone to pathogen invasion, which causes infection. TORCH include TOX, RV, CMV and HSV and other pathogenic microorganisms (Other), and after infection, they can cause damage to a variety of organs[2]. TORCH infection will activate the body's immune response, specific IgM is produced at first and then IgG antibody appears. TORCH-specific IgM antibody positive in serum indicates recent TORCH infection while IgG antibody positive indicates previous TORCH infection. The course of neonatal TORCH infection is mostly short, only manifested as massive synthesis of IgM antibody[3]. The most common clinical manifestation after TORCH infection is hyperbilirubinemia, and sustained elevated bilirubin can cause jaundice. In the research, analysis of the positive rate of serum TORCH-specific antibodies in newborn with jaundice showed that serum TOX-IgM, RV-IgM, CMV-IgM and HSV-IgM positive rate and content of jaundice group were significantly higher than those of control group. It indicated that TORCH infection was associated with neonatal jaundice.

The occurrence of neonatal jaundice is associated with abnormal metabolism of bilirubin, and TORCH infection can cause excessive bilirubin generation or discharge impairment from a variety of ways. On the one hand, infection can cause increased red blood cell damage in the body, resulting in elevated serum indirect bilirubin levels; on the other hand, infection can damage the function of liver cells and also affect the liver intake of unconjugated bilirubin and excretion of conjugated bilirubin, resulting in elevated levels of direct bilirubin and indirect bilirubin in serum[4,5]. Serum TBIL, DBIL and IBIL content are the commonly used indicators to diagnose neonatal jaundice and assess the severity[6,7]. In order to define the value of serum TORCH-specific antibody detection in assessment of neonatal jaundice, the correlation between the positive rate of TORCH-specific antibodies and serum bilirubin content was analyzed in the research, and the results showed that serum TBIL, DBIL and IBIL content of TORCH-positive patients were significantly higher than those of TORCH-negative patients. It indicated that TORCH infection was directly associated with elevated bilirubin levels.

Sustained high levels of bilirubin in the body of jaundice children can cause damage to a variety of tissues and cells, lead to cell

membrane damage, interfere with intercellular substance metabolism and energy metabolism, inhibit the synthesis of proteins and signaling molecules, and thus result in heart, liver, kidney and other target organ damage. Besides, TORCH infection will also cause damage to a variety of tissues and organs. Myocardial cell injury can cause the release of a variety of molecules in cytoplasm into the blood circulation, CK-MB and cTnI are the myocardial cell-specific structural molecule and metabolic enzyme respectively[8]; ALT and AST are the amino acid metabolism enzymes that are located in hepatocyte cytoplasm and cell mitochondria respectively, and liver cell damage will cause the ALT and AST release into the blood[9,10]; RBP and CysC are two kinds of small proteins that can be filtrated and excreted by glomeruli, and in cases of glomerulus damage, RBP and CysC excretion process is affected, which causes elevated serum levels[11,12]. Analysis of the correlation between the positive rate of TORCH-specific antibodies and heart, liver and kidney indicators in the research showed that serum CK-MB, cTnI, AST, ALT, Cys-C and RBP content of TORCH-positive children were significantly higher than those of TORCH-negative children. It indicated that TORCH infection was associated with heart, liver and kidney function impairment in newborn with jaundice.

Newborn neural function is not yet mature, unconjugated bilirubin in serum can freely cross the blood brain barrier and cause neurological damage. Bilirubin directly damages neurons and glial cells, can lead to cell rupture, and can also cause demyelinating lesions. In cases of demyelination damage of nerve tissue, the expression of MBP significantly increases; in cases of neuron and glial cell damage, S100 β , NSE and other molecules in cytoplasm will be released into the blood circulation[13,14]. In addition, bilirubin can inhibit the production of a variety of neurotrophic factors, thus affecting the repair and regeneration of damaged neurons[15]. The cytokines that are closely associated with neuron repair and regeneration include BDNF, NT-3, NT-4 and NGF. Analysis of the positive rate of TORCH-specific antibodies and nerve function-related indicators in the research showed that serum MBP, S100 β and NSE content of TORCH-positive children were significantly higher than those of TORCH-negative children, and BDNF, NT-3, NT-4 and NGF content were significantly lower than those of TORCH-negative children. It indicated that TORCH infection was associated with the neurological damage in newborn with jaundice. Further confirmation of the degree of brain lesions by MRI showed that T1WI signal of pallidum MRI of TORCH-positive children

was significantly higher than that of TORCH-negative children. It indicated that TORCH infection would cause brain MRI signal change.

Based on above discussion, it can be concluded that serum TORCH-specific antibodies significantly increase in children with neonatal jaundice and can assess the degree of bilirubin metabolism disorder and the degree of target organ damage.

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