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Risk Factors and Prevention Strategies of Neonatal Bilirubin Encephalopathy

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ABSTRACT. *Objective: to analyze the risk factors and prevention strategies of neonatal bilirubin encephalopathy. Methods: 150 new born children admitted to our hospital from January 2018 to December 2018 were selected for the study. All the children were hospitalized in our hospital, and the total bilirubin value reached the blood exchange standard. Results: the results of this study showed that the greater the gestational age, the higher the possibility of bilirubin encephalopathy, and the risk factors of encephaloerythroid encephalopathy also included septicemia, acidosis and other aspects, showing a positive correlation, the data difference was statistically significant (P < 0.05). Conclusion: the fetal age of the newborn will affect the incidence of bilirubin encephalopathy, and other factors such as blood bilirubin value, sepsis, hypothermia, asphyxia and anemia are also related to the occurrence of the disease. Bilirubin encephalopathy can lead to hearing damage, brain damage and even death in children, so strict prevention and treatment strategies are needed.*

KEYWORDS: *Neonatal bilirubin encephalopathy; Risk factors; Prevention and treatment strategies*

1. Introduction

Neonatal bilirubin encephalopathy is a kind of acute brain injury caused by the toxic effect of bilirubin in the newborn within one week of birth. The main causes of the disease include excessive production of bilirubin in the early stage of life, immature development of blood-brain barrier in the early stage of birth or low level of plasma albumin. The clinical manifestations of children are yellow skin and mucous membrane, and low response. With the progress of the disease, it will develop into irritable, dyspnea, even convulsion and respiratory failure and other serious symptoms. Therefore, the clinical work needs to focus on the analysis of risk factors of disease, and put forward targeted prevention and control strategies to ensure the safety of newborns. The research report is as follows.

2. Data and Methods

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2.1 General Information

The subjects selected 150 new-born children admitted to our hospital from January 2018 to December 2018.

Inclusion criteria: all the children were hospitalized in our hospital, and the total bilirubin value reached the exchange standard.

Exclusion criteria: the confirmed children have the genetic and metabolic diseases with intracranial infection and neurological symptoms.

2.2 Method

The data of the children were analyzed retrospectively, and then the corresponding clinical investigation criteria were designed. The general data of each selected study object were counted to define the diagnosis criteria of the disease. In this study, bilirubin encephalopathy was diagnosed according to the standard of practical neonatology.

2.3 Statistical Methods

All the data in the study were analyzed by spss20.0 statistical software, and the risk factors were analyzed comprehensively. The counting data was expressed as percentage, and X2 was used for test. When $p < 0.05$, the data difference was statistically significant.

3. Results

The results of this study showed that the older the fetus, the higher the possibility of bilirubin encephalopathy, and the risk factors of encephalopathy also included septicemia, acidosis and other aspects, showing a positive correlation, the data difference was statistically significant ($P < 0.05$). See Table 1 and table 2 for specific data.

Table 1 Association between Neonatal Gestational Age and Bilirubin Encephalopathy (n,%)

Gestational age	Number of cases	Bilirubin encephalopathy	Brain damage	Hearing impairment
Term	111	29(26.1)	61(55.0)	59(53.2)
34-37	24	8(47.1)	16(66.7)	14(58.3)
30-34	12	3(25.0)	8(66.7)	6(50.0)
30 below	3	0(0.0)	3(100.0)	2(66.7)
Total	150	40(26.7)	88(58.7)	81(54.0)

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Table 2 Analysis of Risk Factors of Bilirubin Encephalopathy

Single factor type	Non bilirubin encephalopathy	Bilirubin encephalopathy	X2	P
Septicemia	2	15	14.566	0.000
Acidosis	33	29	5.890	0.001
Low temperature	6	14	8.441	0.000
Asphyxia	15	19	6.250	0.001
anemia	14	16	6.114	0.001

4. Discussion

It can be seen from the study that the blood bilirubin value is undoubtedly the main risk factor of bilirubin encephalopathy. The higher the blood bilirubin value is, the higher the incidence of bilirubin encephalopathy is. Therefore, many studies have analyzed the neurotoxicity of bilirubin, and believed that the occurrence of bilirubin encephalopathy depends on the level of bilirubin in the brain, not only related to the flood of bilirubin in the plasma, but also related to the duration of hyperbilirubinemia. In addition, according to the survey results, septicemia, acidosis, hypothermia, anemia and other high-risk factors are also leading to the disease, but the incidence of premature infants is also high. The reason may be that preterm infants will be hospitalized for a long time in the hospital, and the bilirubin value will be monitored every day. Once abnormality is found, phototherapy intervention can be given.

Because neonatal bilirubin encephalopathy can cause hearing impairment or neurological damage, which is a great threat to life safety, it is of great clinical significance to explore the risk factors and prevention strategies. At present, the clinical manifestations of bilirubin neurotoxicity in the early stage of newborn will be described by “acute bilirubin encephalopathy”. The term “nuclear jaundice” is usually described as chronic persistent bilirubin neurotoxicity injury. The neurotoxicity of bilirubin is highly selective. Excitatory amino acids are involved in the process of apoptosis, and neuron necrosis is the main manifestation under the action of large dose bilirubin.

Various factors outside the body lead to the increase of red blood cell destruction, thus increasing the production of bilirubin, which is also the most common cause of disease. For example, hemolytic disease of newborn, enzyme defect of red blood cell, abnormal hemoglobin and abnormal morphology of red blood cell, etc. In addition, the destruction of red blood cells caused by external factors can also lead to such diseases. In the process of breast-feeding, body bleeding and liver disease can accelerate the production of bilirubin. In addition, the key factor of bilirubin increase is virus infection. The results showed that respiratory tract infection, septicemia and urinary tract infection could be the pathogenic factors.

At present, the diagnostic standard of neonatal bilirubin is not completely determined. In this study, we refer to the clinical diagnostic standard in practical neonatology. It is necessary to pay close attention to the symptoms of nervous

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system in disease diagnosis, and the serum total bilirubin concentration should also be included in the scope of investigation. For example, when the bilirubin concentration exceeds 256.5 μ mol / L, we need to pay close attention to whether there are similar clinical symptoms. According to the degree of systemic symptoms, bilirubin encephalopathy can be divided into four stages, including warning period, spasm period, recovery period and sequelae period. During the warning period, the main symptoms were drowsiness, slow response, weak cuddle reflex, and occasionally vomiting. It lasts for about 24 hours; convulsions begin to appear in the spasm period, and the severe cases will be accompanied by the increase of muscle tension, apnea and even arcuate atony, which lasts for about 12-48 hours; the number of convulsions will be significantly reduced in the recovery period, and the arcuate atony will gradually disappear, and the muscle tension can be restored, which lasts for about 15 days; the sequelae period is nuclear jaundice IV Some serious children may have sequelae such as cerebral palsy and head weakness [1].

Based on the requirements of prevention and treatment, although there is no very effective treatment, the key to disease control lies in prevention, and the prevention focus lies in the prevention and treatment of hyperbilirubinemia. So we should pay close attention to the jaundice of newborn. Once jaundice is found, quantitative examination of serum bilirubin shall be carried out immediately, and comprehensive analysis shall be carried out according to the clinical characteristics, antenatal infection, delivery conditions, etc., so as to reasonably judge whether the nature of jaundice is physiological or pathological. Generally speaking, physiological jaundice does not need special treatment, but pathological jaundice needs to be treated in time. In the process of hospital nursing, medical staff should carry out health education for parents, so that parents can see doctors immediately after finding jaundice. Hyperbilirubinemia of newborn caused by any factors will cause bilirubin encephalopathy, so early diagnosis and early control should be done in hyperbilirubinemia, especially the symptoms of pathological jaundice. Etiology diagnosis and treatment plan should be made quickly. The treatment plan can be carried out around several aspects [2].

(1) Phototherapy. Phototherapy is suitable for indirect increase of bilirubin caused by different reasons, and it is also a direct and effective method to reduce serum bilirubin. After irradiation with light, the unconjugated bilirubin can be transformed into water-soluble isomer, which can be eliminated by urine and bile. Phototherapy can be considered when serum bilirubin is above 12mg / dl. For some high-risk newborns, after early phototherapy, the conversion of bilirubin in circulation can reduce the incidence of neonatal nuclear jaundice. The blue light with the wavelength of 425-475nm is the best. The whole body of the child remains naked. The black eye mask protects the eyes and covers the vulva and anus area at the same time. The duration of phototherapy was chosen according to the degree of the disease, usually 24-48 hours. Some severe patients could be increased to 72-96 hours. When the clinical jaundice symptoms of the children were obviously weakened, phototherapy could be stopped. However, it should be noted that phototherapy will not affect hemolysis, and the degree of anemia of children should be concerned to consider phototherapy methods, and riboflavin should be

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supplemented if necessary [3].

(2) Albumin, plasma. Its function is to increase the binding with free bilirubin and reduce the incidence of bilirubin encephalopathy. If the indirect bilirubin concentration is high and the rising speed is fast, it can not be used as a routine drug, some children with anemia and edema are also forbidden to use the program.

(3) Blood exchange therapy. The further development of antibody exchange and hemolysis of sensitized red blood cell tissue, as well as correction of anemia and heart failure in children, were also discussed. For hemoglobin below 120g / L, or heart failure, small premature infants, blood exchange indications should be appropriately relaxed .

In terms of nursing measures, medical staff should focus on the perinatal health care, strengthen the management of high-risk pregnant women, improve the existing delivery measures, and prevent premature delivery, dystocia or neonatal infection. High risk infants need to carry out rapid monitoring of serum bilirubin after delivery in order to diagnose and prevent hyperbilirubinemia as soon as possible. For the children with jaundice, light therapy can be used, on the one hand, to reduce the symptoms of hyperbilirubinemia, on the other hand, to quickly grasp the blood exchange period and avoid the occurrence of bilirubin encephalopathy. In the treatment process, we should pay attention to heat preservation at any time to prevent hypoxia and acidosis caused by hypoglycemia. The current clinical work is mainly based on the clinical manifestations and bilirubin level in combination with cranial MRI to carry out a comprehensive evaluation of the disease, with the purpose of early detection and early intervention, so that more valuable diagnostic methods can play a role in the stage of neurotoxic coupling. In the future work, the research on the determination of metabolites in the brain around the magnetic resonance spectroscopy will be further deepened to provide scientific basis for diagnosis [4].

5. Conclusion

In conclusion, the fetal age of the newborn will affect the incidence of bilirubin encephalopathy, and other factors such as blood bilirubin value, sepsis, hypothermia, asphyxia, anemia and so on are also related to the occurrence of the disease. Bilirubin encephalopathy can lead to hearing damage, brain damage and even death in children, so strict prevention and treatment strategies are needed.

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