



Effect of intrauterine resuscitation on umbilical cord blood parameters of full-term fetal distress and evaluation of neonatal nerve function

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ABSTRACT

Objective: To study the effect of intrauterine resuscitation on umbilical cord blood parameters of full-term fetal distress and neonatal nerve function. **Methods:** A total of 74 cases of women who gave birth in Gynecology and Obstetrics Department of our hospital and had fetal distress during labor from February 2008 to October 2010 were selected for study and randomly divided into two groups, observation group received intrauterine resuscitation, control group received conventional treatment, and then contents of umbilical arterial blood gas parameters and cytokines of two groups of patients, contents of serum nerve injury molecules of neonates as well as neonatal asphyxia condition and nerve function were compared. **Results:** pH value, PO₂ and HCO₃⁻ in umbilical cord blood of observation group were higher than those of control group, and PCO₂ and BE absolute value were lower than those of control group; IL-6, IL-8 and IFN- γ contents in umbilical arterial blood and umbilical venous blood of observation group of patients were significantly lower than those of control group; 1 d, 3 d, 5 d and 7 d after birth, serum NSE and S-100 protein contents of observation group of neonates were significantly lower than those of control group; neonatal asphyxia condition and nerve function were better than those of control group. **Conclusion:** Intrauterine resuscitation can improve intrauterine fetal anoxia and reduce acidosis while reduce neonatal nerve function injury and prevent neonatal asphyxia, and it is an ideal method to treat full-term fetal distress.

1. Introduction

Fetal distress is a sign of intrauterine fetal anoxia, it endangers fetal health and life, it is the main factor causing increased incidence of perinatal death and disability, and it is also the most common obstetric severe complication during delivery[1,2]. The main clinical treatment of fetal distress is increasing maternal blood oxygen content and thus improving fetal blood and oxygen supply. Oxygen uptake, intravenous injection of 50% glucose, vitamin C and sodium bicarbonate are the commonly used methods that can increase fetomaternal glucose storage, reduce acidosis but fail to directly improve the pathological condition of fetal ischemia and hypoxia, so the curative effect is not exact[3]. Intrauterine resuscitation is a method of treating fetal distress and preventing neonatal hypoxic-ischemic encephalopathy rising in recent years, and it improves

fetal blood and oxygen supply through supplementing sodium lactate ringer solution and hydroxyethyl starch 200/0.5 sodium chloride injection[4]. In the following research, the effect of intrauterine resuscitation on umbilical cord blood parameters of full-term fetal distress and neonatal nerve function was analyzed.

2. Subjects and methods

2.1. Subjects

A total of 74 cases of women who gave birth in Gynecology and Obstetrics Department of our hospital and had fetal distress during labor from February 2008 to October 2010 were selected for study. According to different treatment methods, they were randomly divided into two groups, each group with 37 cases. Observation group received intrauterine resuscitation, they were (28.25±2.95) years old and the gestational age was (38.19±3.41) weeks; control group received conventional treatment, they were (28.10±2.78)

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3.3 Serum nerve injury molecule contents

Analysis of serum NSE and S-100 protein contents within two groups of neonates showed that 1 d, 3 d, 5 d and 7 d after birth, serum NSE and S-100 protein contents of both groups of neonates showed decreasing trend; analysis of serum NSE and S-100 protein contents between two groups showed that 1 d, 3 d, 5 d and 7 d after birth, serum NSE and S-100 protein contents of observation group of neonates were significantly lower than those of control group.

Table 3.

Comparison of serum nerve injury molecule contents between two groups of neonates.

NSE contents(ng/L)		1 d after birth	3 d after birth	5 d after birth	7 d after birth
	Observation group	29.59±3.32	23.32±2.55	17.52±2.12	11.84±1.34
	Control group	64.42±7.14	52.59±5.91	40.34±3.95	26.59±3.32
	<i>T</i>	13.822	12.193	15.393	14.420
	<i>P</i>	<0.05	<0.05	<0.05	<0.05
S-100 protein contents (ng/L)		1 d after birth	3 d after birth	5 d after birth	7 d after birth
	Observation group	2.52±0.27	2.01±0.22	1.54±0.11	1.03±0.12
	Control group	5.51±0.59	4.08±0.55	3.32±0.38	2.48±0.26
	<i>T</i>	11.394	10.491	13.291	12.286
	<i>P</i>	<0.05	<0.05	<0.05	<0.05

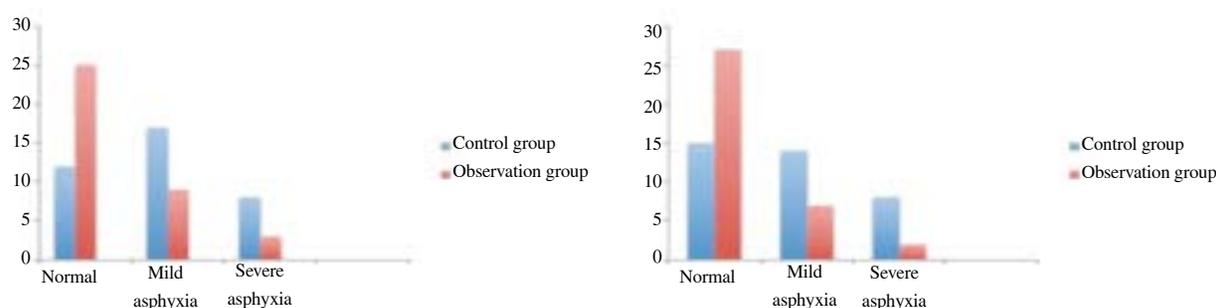


Figure 1. Comparison of the classification of neonatal asphyxia extent and nerve function between two groups of neonates. Left figure was for classification of asphyxia extent and right figure was for classification of nerve function.

4. Discussion

Fetal stress is a common cause of perinatal death and disability, continuous ischemia-hypoxia can affect the growth of fetal nerve function and cause legacy of nerve function injury after birth. Clinical oxygen uptake, intravenous injection of 50% glucose, vitamin C and sodium bicarbonate are the commonly used methods. Intravenous injection of hypertonic glucose can quickly increase glucose storage in maternal and fetal tissue, vitamin C can reduce the permeability and fragility of capillary endothelial cells, and intravenous drip of sodium bicarbonate can improve the concentration of maternal bicarbonate, neutralize acid-base substances in fetus and alleviate acidosis. But above treatment option is only for the intervention of body's acidosis, glycogen storage deficiency and other pathological links, and fails to directly solve the contradiction of insufficient blood and oxygen supply in fetus, acidic metabolites will be continuously generated, and the overall effect is not ideal[5].

Intrauterine resuscitation is a method of treating fetal distress and

3.4. Classification of neonatal asphyxia extent and nerve function

Apgar score was used to judge neonatal asphyxia extent, and detailed analysis was as follows: incidence rates of mild asphyxia and severe asphyxia of observation group of neonates were lower than those of control group; brainstem auditory evoked potential was used to judge neonatal nerve function, and detailed analysis was as follows: incidence rates of mild abnormality and severe abnormality of observation group of neonates were lower than those of control group.

preventing neonatal hypoxic-ischemic encephalopathy rising in recent years [6]. Sodium lactate ringer solution contains Ca^{2+} , Mg^{2+} , K^+ , Na^+ , $\text{C}_3\text{H}_5\text{O}_3^-$ and other electrolytes close to the physiological levels, it can maintain the stability of body's electrolytes and internal acid-base environment, and it is suitable for the correction of metabolic acidosis; hydroxyethyl starch 200/0.5 sodium chloride has the unique effect of preventing and blocking capillary leakage, and it can increase blood volume and improve oxygen supply and hemodynamics[7]. The treatment method used sodium lactate ringer and hydroxyethyl starch 200/0.5 sodium chloride for recovery, it can rapidly increase blood volume within a short period of time, and combined with oxygen uptake and left lateral decubitus position, it can rapidly infiltrate oxygen into histocytes, thus increasing oxygen supply in histocytes and improving maternal blood oxygen saturation and partial pressure oxygen [8]. At the same time, increased blood perfusion in placenta and umbilical cord improves intrauterine fetal anoxia state, improves the effect of recovery and reduces the rate of neonatal asphyxia[9].

In the research, intrauterine resuscitation was adopted to treat full-term fetal distress, and umbilical cord blood parameters

and neonatal nerve function were analyzed. Umbilical cord is a maternal and fetal substance exchange channel, and ischemia-hypoxia caused by fetal distress can lead to metabolic acidosis, hypercapnia, and thus fetal nerve function injury. Under the pathological condition, blood gas parameters in umbilical cord blood will obviously change[10]. In the research, blood gas analysis of umbilical cord blood was conducted after intrauterine resuscitation, and results showed that pH value, PO₂ and HCO₃⁻ in umbilical cord blood of observation group were higher than those of control group, and PCO₂ and BE absolute value were lower than those of control group. This indicated that intrauterine resuscitation could more effectively increase oxygen supply and correct acidosis. Study in recent years proves that hypoxia caused by fetal distress can not only cause acidosis, but also lead to content change of a variety of cytokines and exert cytotoxic effect[11]. Cytokines involved in the process include IL-6, IL-8 and IFN- γ [12], and analysis of the contents of above cytokines in umbilical cord blood in the research showed that IL-6, IL-8 and IFN- γ contents in umbilical arterial blood and umbilical venous blood of observation group of patients were significantly lower than those of control group.

Fetal distress can cause occurrence of neonatal asphyxia and hypoxic-ischemic encephalopathy, and lead to neonatal nerve function injury. Neuron specific enolase (NSE) and S-100 protein are two types of proteins highly expressed in central nervous system[13,14]. NSE is simultaneously expressed in nerve cells and gliocytes, and involved in cell glycolysis and energy metabolism process; S-100 protein is mainly located in astrocytes and involved in cell structure maintenance, cell growth, energy metabolism, intercellular signal transduction and other processes. In cases of hypoxic-ischemic damage of neurons and glial cells, NSE and S-100 protein enter into cerebrospinal fluid from cells, then pass through blood-brain barrier and enter into blood circulation. Study has confirmed that serum NSE and S-100 protein contents have good consistency with nerve function injury. In the research, serum NSE and S-100 protein contents of two groups of neonates within 1 week after birth were continuously analyzed, and results showed that serum NSE and S-100 protein contents of both groups of neonates showed decreasing trend, and serum NSE and S-100 protein contents of observation group of neonates were significantly lower than those of control group. This indicated that intrauterine resuscitation could reduce fetal nerve function injury.

After getting the above results, neonatal asphyxia condition and nerve function were further analyzed. Apgar score is the most commonly used method of judging the neonatal conditions and asphyxia extent, Apgar score was used to judge the severity of neonatal asphyxia, then asphyxia extent was compared between two groups of neonates, and results showed that incidence rates of mild asphyxia and severe asphyxia of observation group of neonates were lower than those of control group. After that, brainstem auditory evoked potential (BAEP) was used to judge nerve function, and neonatal asphyxia can cause extensive damage of the brain structure, manifested as evoked potential change[15]. In the research, the abnormal degree of BAEP of two groups of neonates was analyzed, and results showed that incidence rates of mild abnormality and severe abnormality of observation group of neonates were lower than those of control group. It indicated that intrauterine resuscitation could prevent the occurrence of neonatal

asphyxia and at the same time, it could improve nerve function.

To sum up, intrauterine resuscitation can improve intrauterine fetal anoxia and reduce acidosis while reduce neonatal nerve function injury and prevent neonatal asphyxia, and it is an ideal method to treat full-term fetal distress.

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