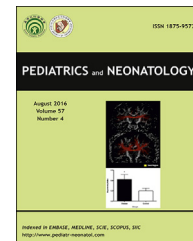


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Original Article

Treatment outcomes and associated factors among extremely preterm infants in a major children hospital in Guangxi, China

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Received Sep 2, 2016; received in revised form Mar 19, 2017; accepted Sep 22, 2017

Available online ■ ■ ■

Key Words

extremely preterm infant;
outcome;
influence factor

Background: In developing countries, infant survival rate and long-term outcomes of extremely preterm infants (EPIs) have significantly improved due to advances in perinatal care. The striking gap in the treatment outcome of EPIs between China and the other developed countries was a major concern. To assess treatment outcomes and associated factors among EPIs in Nanning, China. **Methods:** This was a perspective study consisting of eligible cases with gestational age between 22 and 28 weeks and infants were followed to 18–24 months of age. Data including clinical characteristics, perinatal factors and after-birth conditions were collected from the neonatal intensive care unit (NICU) in a major women's and children's health hospital in Guangxi Province from January 1st 2010 to February 1st 2015.

Results: During that period 79 EPIs were born in the hospital. Twenty-eight infants died in hospital after their parents decided to withdraw clinical treatment. Of the 51 surviving infants, 5 infants were lost to follow-up. Eleven of the 46 infants were evaluated at 18–24 months of age and were diagnosed with neurodevelopmental disability and 35 infants showed normal motor language development. The incidence of intrauterine infection and intraventricular hemorrhage (IVH) grade III were both higher in the group of infants who were diagnosed neurodevelopmental disability than in the group of infants with normal motor language development ($p < 0.05$). Logistic regression analysis showed that intrauterine infection (OR = 33.290, 95%CI = 2.180–508.351) and IVH grade III (OR = 26.814, 95%CI = 3.631–197.989) were the major risk factors for neurodevelopmental disability in EPIs.

Conclusions: Intrauterine infection and IVH grade III were associated with the neurodevelopmental disability in EPIs.

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<https://doi.org/10.1016/j.pedneo.2017.09.008>

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Please cite this article in press as: Li Y, et al., Treatment outcomes and associated factors among extremely preterm infants in a major children hospital in Guangxi, China, Pediatrics and Neonatology (2017), <https://doi.org/10.1016/j.pedneo.2017.09.008>

1. Introduction

With the increased development of assisted reproductive technology and perinatal care, the prospective birth of EPIs has been increasing over the last few decades. In developing countries, infant survival rate and long-term outcomes of EPIs have significantly improved due to advances in perinatal care.¹ Unfortunately, in China EPIs were classified as aborted fetuses. The proportion of EPIs who received intensive care was at a low level and the management of EPIs was inefficient and ineffective. The striking gap in the treatment outcome of EPIs between China and the other developed countries was a major concern.

The goal of this study was to improve the clinical management and treatment outcomes of EPIs. Our hospital in Nanning is a major referral and healthcare center for neonates in the Guangxi Province of China. Seventy-nine EPIs were admitted into our hospital from January 1st 2010 to February 1st 2015 and subsequently enrolled into this study. The perinatal conditions, neonatal diseases and prognosis were analyzed in order to determine the associated factors for the treatment outcomes of these EPIs.

2. Patients and methods

2.1. Patients

Eligible cases with gestational age between 22 and 28 weeks were classed as extremely preterm births and were followed to 18–24 months of age from the NICU of Guangxi Maternal and Children's Hospital from January 1st 2010 to February 1st 2015. No infants below 25 weeks' gestation were admitted into this NICU. According to the evaluation at 18–24 months' follow-up, cases were divided into 2 groups: NML group for infants who exhibited normal motor language development and ND group for infants with neurodevelopmental disabilities.

2.2. Clinical definitions

An *EPI* was defined as neonate born with gestational age between 22 weeks and 28 weeks.² *Birth weight* was defined as the body weight which was measure within 1 h after birth.² Information about birth weight, gestational age and the maternal history were provided by parents and/or obstetricians. *Small-for-gestational-age (SGA)* and *intrauterine growth retardation (IUGR)* were defined as a neonate whose birth weight was below the 10th percentile for gestation age (GA) as determined through an ultrasound.³ The *ponderal index* is a measure of leanness of an infant calculated as a relationship between mass and height and is calculated as the birth weight (g) \times 100/birth length (cm). *Symmetric SGA* refers to a neonate of GA of less than or equal to 37 weeks with a ponderal index of greater than 2 and a length/head circumference of less than 1.36. *Asymmetric SGA* refers to a neonate of GA of less than or equal to 37 weeks with a ponderal index of less than 2 and a length/head circumference of less than 1.36.² *Intraventricular hemorrhage (IVH)* was defined and classified as described by Palile.² A *Full course of prenatal*

glucocorticoids refers to injection of glucocorticoids (intramuscular betamethasone 12 mg q24h or intramuscular dexamethasone 6 mg q12h) for 48 h before labor.⁴

Asphyxia, sepsis, respiratory distress syndrome (RDS), pneumonia, pulmonary hemorrhage, persistent pulmonary hypertension of newborn (PPHN), neonatal necrotizing enterocolitis (NEC), patent ductus arteriosus (PDA), bronchopulmonary dysplasia (BPD), retinopathy of prematurity (ROP), and other neonatal diseases are defined according to entries in NEONATOLOGY.² Definitions of pregnancy induced hypertension syndrome (PIH), intrahepatic cholestasis of pregnancy (ICP), gestational diabetes mellitus (GDM), premature rupture of membrane (PROM) and cardiac vascular dysfunction are to be found in OBSTETRICS.⁵ Intrauterine infections (IUI) referred to general infections situated in or occurring within the uterus.⁶ Neurodevelopmental disability refers to a persistent retardation or cessation of neurodevelopment due to multiple reasons, and leads to intellectual disability which presents as poor problem-solving ability and poor adaptability to society. Motor disorders were defined generally as the abnormality in motor development, motor function, motor quality, motor speed and motor efficiency due to by variable causes.⁷

2.3. Statistical analysis

Data were compared between the 2 groups by Chi-square test, Fisher's exact test was utilized when case number in the particular subgroup was less than 5, and logistic regression analysis was applied to analyze multiple factors. Statistically significant difference was defined as $P < 0.05$.

3. Results

Of the 79 EPIs included in this study, 28 died during their stay in hospital after the parents decided to withdraw treatments. Of the 51 surviving infants, 5/79 (6.32%) infants were lost to follow-up. 11/79 (13.92%) infants developed neurodevelopmental disabilities, including 2 (2.53%) who presented with a lag of motor development, 5 (6.33%) who presented a lag of language development, 2 (2.53%) who presented with behavioral disorders and 2 (2.53%) who were diagnosed cerebral palsy. 35/79 (44.30%) infants presented normal motor language development.

Of the infants that were followed-up, 17 were assessed by qualified neonatal care unit specialists or were seen in the rehabilitation department at regular intervals, 23 were followed by their local pediatric departments or children healthcare departments at regular intervals, and 6 were followed at variable intervals.

When baseline and neonatal characteristics, condition at birth and neonatal diseases were compared between the groups, the incidence of intrauterine infection and IVH grade III were higher in the ND group than in the NML group, and the differences were statistically significant ($p < 0.05$; Table 1).

As the factors which were considered to be significantly different in single factor analysis, intrauterine infection and IVH grade III were analyzed by logistical regression analysis. The results showed that intrauterine infection and

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