Recent Outcomes of Very Low Birth Weight Infants of the Three University Hospital in the Busan Area

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Objective: The survival rate of very low birth weight infants (VLBWI) has increased markedly in Korea. The purpose of this study was to investigate the outcome of VLBWI in Busan area.

Methods: We retrospectively reviewed 273 VLBWI less than 1,500 g who were admitted to the neonatal intensive care units of three university hospitals in Busan between January, 2007, to December, 2008. The survival rate, distribution of infants by birth weight and gestational age, and complications were compared with previous reports in Busan.

Results: We enrolled 273 VLBWI, including 31.1% extremely low birth weight infants, and the overall survival rate of VLBWI was 77.3%. Mean gestational age was 29.2±2.9 weeks and birth weight was 1,115±249 g. Infants weighing <750 g, 750-999 g, 1,000-1,249 g and 1,250-1,499 g showed survival rates of 30.4%, 62.9%, 83.0%, and 92.0%, respectively. Infants at ≤24 weeks, 25-26 weeks, 27-28 weeks and ≥29 weeks had survival rates of 25.0%, 57.5%, 75.0%, and 91.0%, respectively. Survival rates by birth weight (<750 g, 750-999 g) and gestational age (≤24 weeks, 25-26 weeks) had increased significantly compared to 2003-2005. Common morbidities of VLBWI included respiratory distress syndrome (54.9%), patent ductus arteriosus (33.3%), bronchopulmonary dysplasia (31.5%), sepsis (20.1%), necrotizing enterocolitis (7.3%), retinopathy of prematurity (≥ stage III) (6.2%) and intraventricular hemorrhage (≥Gr III) (5.1%).

Conclusions: The survival rate of VLBWI born in Busan was 77.3% over the past 2 years. Survival rates of extreme prematurity weighing less than 1,000g and gestational age of ≤26 weeks were significantly increased.

Key Words: Infant, Very low birth weight, Infant, Extremely low birth weight, Survival rate, Respiratory distress syndrome

The birth rate of Korea was relatively high in the 1970s, with 4.71 births per woman, but rapidly declined to 1.7 births per woman in 2008, one of the lowest in the world, so an aging society and low birth rates can become a serious problem.¹ The birth rate in Busan is 1.3 births, one of the lowest among Korean cities.¹ The ratio of premature infants and low birth weight infants is increasing in Korea.² The ratio of low birth weight infants and very low birth weight infants (VLBWI) was 9.8% and 1.7%, respectively in 1996,³ and changed to 22.0% and 4.6% in 2007 according to a survey of 57 general hospitals.² Infant mortality and neonatal mortality are important indices for evaluating public health, welfare, and socioeconomic status of the country.¹ As two thirds of infant mortality occurs in neonatal period and two thirds of neonatal mortality occurs in premature infants and low birth weight infants,⁴ the increasing ratio of low birth weight infants may increase neonatal mortality, morbidity, and infant.
mortality. Improving the survival of low birth weight infants will decrease infant mortality and improve public health. Improving the survival of VLBWI weighing less than 1,500 g reflects improvements in neonatal intensive care units.

The survival rate of VLBWI improved after the introduction of neonatal intensive care in the 1980s. The survival rate of VLBWI in Korea was 30% in the 1960s, improved to 40% in the 1970s and 1980s, 65.8% in the early 1990s, 71.3% in the late 1990s, and dramatically improved to 78.8% in the early 2000s. The survival rate of VLBWI was 74–88.3% after 2000, 84.7% in 2007 across the nation. The survival rate of extremely low birth weight infants (ELBWI), weighing less than 1,000 g, is also improving: 37.6% in the early 1990s, 62–67.8% in the 2000s, up to 82–85.3% in some medical centers in Seoul. Surfactant therapy for respiratory distress syndrome (RDS) in premature infants has played a major role in the increased survival of VLBWI. Improved quality of neonatal intensive care, including improvements in perinatal care such as active antenatal corticosteroid therapy, development of new devices such as high frequency oscillatory ventilators and high humidity incubators, improved nutritional care such as total parenteral nutrition, premature formula, and human milk fortifier, and specialized personnel for prematurity care, also played important roles. We suggest ways to improve neonatal intensive care in Busan area.

Materials and Methods

We enrolled VLBWI, weighing less than 1,500 g, admitted to the neonatal intensive care unit of three university hospital in Busan (Kosin University Gospel Hospital, Dong-A University Medical Center, Inje University Busan Paik hospital) from January, 2007, to December, 2008. Clinical data were collected and analyzed retrospectively from the medical records during admission in the NICU. We evaluated perinatal and birth variables such as maternal pregnancy-induced hypertension, gestational diabetes mellitus, chorioamnionitis, premature rupture of the membranes, in vitro fertilization, multiple pregnancy, antenatal corticosteroid therapy, the mode of delivery, the mean gestational age, birth weight, sex ratio, small for gestational age, and Apgar scores. Neonatal morbidities included RDS, patent ductus arteriosus (PDA), intraventricular hemorrhage (IVH), bronchopulmonary dysplasia (BPD), necrotizing enterocolitis (NEC), retinopathy of prematurity (ROP), sepsis, starting day of enteral feeding, day of full enteral feeding, duration of total parenteral nutrition (TPN), the number of days on ventilator, and the number of days spent in the hospital. The survivors were defined as infants discharged from the hospital alive, and infants who left the hospital against medical advice were included as death. IVH was defined according to the classification of Papile by brain ultrasonography, and were limited to a high grade (Gr III and IV). RDS was defined as 1) prematurity, 2) increased respiratory difficulty in newborn infants, and 3) diffuse reticulogranular appearance on chest x-ray, increasing oxygen dependency, and decreasing PaO2. BPD included oxygen treatment for at least 28 days, and NEC was classified by modified Bell’s criteria. ROP was limited to high stages (≥ stage III) by the international committee for the classification of the ROP. PDA was confirmed by echocardiography in patients with hemodynamically significant symptoms, and treated with medication or surgical ligation. Sepsis was limited only to when blood culture was positive, with the clinical signs of a systemic infection. The day of full enteral feeding was defined as the day when the baby was fed 120 mL/kg of breast milk or formula milk.