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An Extreme preterm infant with multiple complications: a case study

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Cover Page Footnote

The authors would like to acknowledge the child and the mother for being a participant in this study.

Case Report

An Extreme preterm infant with multiple complications: a case study

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Abstract

Extreme preterm birth is the most critical risk factor, leading to adverse clinical and developmental outcomes. This case study report presents the clinical outcome, and follow-up of an extremely preterm female infant admitted to the Neonatal Intensive Care Unit (NICU) who had a prolonged period of ventilation support and multiple complications. She had sepsis, hepatosplenomegaly and was on antibiotic, antifungal, and antiviral treatment. She has recovered and showed significant improvement in her health status. Her growth and development were assessed until five years of corrected age.

Keywords: extreme preterm infant, follow-up, health outcome, multiple complications, Intra Uterine Growth Restriction (IUGR), Respiratory Distress Syndrome (RDS).

Introduction

Medical advances in preterm care and technological encroachments have improved the chances of survival (Carbajal et al., 2008). After birth, the immunologic, metabolic, and endocrine mechanisms become independent from placental circulation to maintain physiological stability. This mechanism affects the preterm infants who are not prepared to face the challenges (Moore, Berger, & Wilson, 2014). The common complications of preterm birth include Respiratory Distress Syndrome (RDS), neonatal sepsis, Necrotizing Enterocolitis (NEC), Intraventricular Haemorrhage (IVH), and Retinopathy of Prematurity (ROP) (Ward & Beachy, 2003; Howson, Kinney, & McDougall, 2013). These high-risk infant follow-ups also help assess the quality of life, which is essential for family members during decision-making regarding high-risk infant care at home (Lex et al., 2014).

Neurodevelopmental outcomes vary according to gestational age. Research studies reported that low birth weight infants were at higher risk for developmental delay (Hilaire et al., 2021). In this case study, the authors assessed the neurodevelopmental outcomes at 42 months of corrected age using the Bayley-III scales, and the assessment continued until 60 months.

Case presentation

A female extreme preterm infant, weighing 510 gm, with 26 weeks of gestation at birth, was diagnosed with Small for Gestational Age (SGA), right upper lobe pneumonia with severe Respiratory Distress Syndrome (RDS). The infant was delivered by a 36 years Gravida: 4, Living:1, and Abortion:2 mother on 15 June 2015. She received early surfactant therapy and was discharged against medical advice due to financial constraints and readmitted within 24 hours because of respiratory distress, severe cyanosis, recurrent episodes of apnoea, bradycardia, and severe respiratory acidosis. The infant did not respond to Continuous Positive Airway Pressure (CPAP) support, required invasive ventilation,

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extubated, and gradually weaned and connected to CPAP. The infant developed sepsis feeding intolerance and was positive for Cytomegalovirus (CMV). It recovered slowly, steadily and improved its health status"

Birth history

Mother had spontaneous conception. The anomaly scan done was normal. She was immunized with Tetanus Toxoid and on regular iron and calcium supplementation. And she was also administered one dose of steroid prophylaxis. There was no history of leaking or bleeding per vagina. At 26 weeks gestation, the mother was admitted with high blood pressure. Doppler study showed reduced renal end-diastolic flow and taken up for emergency LSCS. The infant had a weak cry at birth, and her heart rate was < 40/minute. After intubation, its heart rate improved and shifted to the NICU for further management.

Investigations

Chest X-Ray showed severe RDS and right lung upper lobe consolidation. The sepsis screen was positive (developed fungal sepsis and positive for CMV). Neurosonogram revealed bilateral mild periventricular flaring. Abdomen X-ray at 32 weeks of corrected gestational age showed gaseous distended bowel loops. The ROP study at 34 weeks showed Zone II. Stage II ROP at 38 weeks of corrected age revealed regression of ROP. Ultra-sonogram abdomen at 36 weeks showed hepatosplenomegaly and minimal free fluid in the gut. In the 12th and 24th-month follow-up, the hearing screen was normal, and in the ROP study, the bilateral fundus also showed normal.

Management and Outcome

The baby had a weak cry at birth and bradycardia, intubated, and shifted to NICU. Early Rescue Surfactant Therapy was given and connected to the SIMV (Synchronized intermittent mandatory ventilation) mode of ventilation. Due to right lung consolidation, ventilator support was continued the infant was administered parenteral nutrition (amino acids) 1 gm/kg, dextrose 6 mg/kg/min. From day three, one ml second hourly breastmilk (expressed) was started. The infant had persistent thrombocytopenia. The evaluation also showed candida sepsis and hence infant was treated with antibiotics Cefoperazone and Amikacin for three weeks and fluconazole for six weeks. The test was positive for CMV and therefore the infant was treated with Vancyclovir for six weeks. The child had feeding intolerance, abdominal distension, and vomiting and noticed pale stools, dark yellowish urine, persistent thrombocytopenia, anaemia, and a deranged liver function. Kept NPO (Nil Per Oral) till her gastrointestinal symptoms decreased. One unit of each packed cell and platelet and two units of fresh frozen plasma were transfused. Orogastric feeding was restarted and the feeds were upgraded as per tolerance. Also, parenteral nutrition was continued until the infant started taking full feeds. The weight of the infant was monitored, prokinetics were added and slowly feeds were graded up. Once feeds were tolerated well by the infant, respiratory distress subsided. Alternate Katori feeds were started on her with close observation. Once Katori feeds were accepted well, the mother started breastfeeding, and intermittent additional feeds were also given.

Nursing care included complete assessment, developmentally supportive care, and maintaining aseptic precautions. She was monitored closely for complications, weight gain, and an increase in head circumference during the hospital stay.

Condition on Discharge

The weight of the neonate during the discharge was 2,535 gm, and the head circumference was 34 cm, moving all the limbs against gravity. No icterus was found. The stool was yellow in colour. Liver was 4 cm, palpable and firm. Spleen was 3 cm, palpable and firm**.** The child was partially on breastfeeding with top feeding and additives. The child was discharged with the advice to the mother to continue breastfeeding and provide full feeding with additives. The parents had the financial burden of a long period of hospitalization, which was supported by the 'poor patient fund' of a hospital, other agencies, and trustees.

Follow up

The child had a regular follow-up and was referred to the physiotherapy department during the initial

period to promote motor development and continued physiotherapy at home by parents. She had repeated upper respiratory tract infection episodes and was treated with antibiotics and expectorants and was given an age-appropriate immunization. In the 24th month, hearing screening and ROP were repeated. There was no history of rehospitalization. The growth parameter was initially a consistent flat curve and gradually improved later. Her weight at five years of age was 15 kg and her height was 98 cm. Development score was regularly assessed by using the Bayley-III scale (Bayley, 2006).

Table 1

Bayleys Scale of Infant Development of Infant and Toddler III

Development	Expected at 42 months	Development present at
Motor	• Balances on both feet, • Walks backwards close to the path, • Walks up alone and alternates in between Fine motor: • Grasps crayon using mature, controlled dynamic grasp while making a mark on the paper. • And able to replicate ten blocks.	48th month
Language	Receptive: • Responds to directions, • Understands pronouns: you, me, and I. • Able to identify by labelling two correct pictures. Expressive language: • The child uses verbs with one picture action. • The child correctly uses plural forms for names, books, hands, shoes, fingers, and ears.	48th month
Cognitive	• Able to identify big duck and small duck (compare the mass). • The child correctly identified big blue and big red duck and little yellow duck (matches size).	48th month 54th month

Discussion

Numerous studies report inconsistency in the health outcome of preterm infants. Despite the multiple complications present during the first six months, the infant had a flat growth curve (short stature) and this was consistent with other studies. Her head circumference was also consistently lower compared to the term infants. A comparative study conducted for the cohort of extremely preterm infants admitted in the neonatal unit between 1994-1995 and 2004-2008 showed increased weight and head circumference during hospitalization, and it was statistically significant. The study concluded that better nutrition supplement provision with close monitoring in the neonatal care unit enhances the growth of extremely preterm infants in the neonatal unit (Zachariassen & Hansen, 2015).

In the present case study, compared to the expected BSID III score (Bayley Scales of Infant Development) corrected at 42 months, it showed that at 48 months the scores were: motor: 94, language: 92, and cognitive: 91. The cognitive development criteria elicit only at 54 months of corrected age. A study was conducted in South Korea to find the developmental outcome of preterm infants using Bayles-III scales, the study result of BSID scores were: motor: 91.8±23, language 92±17.5, and cognitive scores: 88.8±18.6 (Ahn & Kim, 2017) The present study child achieved slightly delayed motor, language, and cognitive development composite scores.

Conclusion

It is a known fact that advanced specialized care is necessary to prevent complications and promote preterm infants' physical and mental health status. Also, early intervention is needed based on the assessment by the specialist. She has received advanced quality care with close observation, empowered mother on preterm care at home, advised a regular high-risk follow-up, and planned growth and development assessment. The child showed a consistent growth catch up despite many complications during hospitalization. Neurodevelopment assessment is necessary to understand motor, cognitive, and language development. Education about the care of preterm is crucial for the parents about early sensory stimulation

and additional nutritional supplement to enhance growth and development. Her growth and development were apparently near normal during her follow-up, and now she is studying in upper kindergarten schooling.

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