

## Survival of a 590 Gram Infant: Management Challenges in a Developing Country

Okposio Mariere Matthias<sup>1</sup>, Lawal Olubunmi Adeola<sup>2</sup>, Salau Qasim Olakunle<sup>2</sup>, Ibrahim Isa Ayuba<sup>3</sup>

<sup>1</sup>Consultant Paediatrician Lily Hospitals Limited Warri, Nigeria

<sup>2</sup>Consultant Paediatrician Federal Medical Centre Ido-Ekiti, Nigeria

<sup>3</sup>Consultant Obstetrician Niger Delta University Teaching Hospital Okolobiri, Nigeria

### Abstract

The survival of extreme preterm newborn in Nigeria is still a serious challenge due to lack of equipment and trained personnel. Giving the management challenges with accompanying high mortality in this group of infants, the decision to resuscitate them at delivery sometimes presents difficult ethical issues for caregivers and parents. It is against this backdrop that we report the survival of a 590grams growth restricted female infant delivered at 28 weeks of gestation.

Key words: Survival, Extreme Preterm Infant, Developing country

### INTRODUCTION

Management of extremely preterm infants is one of the most challenging aspects of neonatology.<sup>[1]</sup> These challenges arise due to the immature nature of the infant's organs and systems which makes them susceptible to infections, respiratory distress, temperature instability, intraventricular haemorrhage, necrotizing enterocolitis, apnoeic attacks and feeding intolerance. Others factors relate to the availability of equipment to nurse the infant such as incubators, continuous positive airway pressure (CPAP) machines; ventilators amongst others.<sup>[2]</sup> In high-income countries, these challenges have largely been overcome resulting in less than 10% mortality of extremely low birth weight infants. On the other hand, in low income countries, more than 90% of extremely preterm infants still die within the first few days of life owing to non-availability of basic equipments and skilled personnel to care these children.<sup>[3]</sup>

It is generally believed that an infant born with a birth weight of less than 1000grams in Nigeria is unlikely to survive because of the obvious management challenges in our locality.<sup>[4]</sup>

Therefore; the decision to resuscitate extremely low birth weight infants sometimes presents difficult ethical issues for caregivers and parents. It is against this backdrop that we report the survival of a growth restricted 590grams infant who was conceived by in vitro fertilization and delivered at 28 weeks gestation.

### CASE REPORT

A female baby, whose conception resulted from in-vitro fertilization (IVF), was delivered by emergency caesarean section at gestational age of 28weeks following maternal severe PIH with imminent eclampsia and intrauterine growth restriction. She weighed 590gram at birth with APGAR scores four and six at one and five minutes. The infant was admitted to the special care baby unit and commenced on intravenous fluid of 10% dextrose water

### Address for correspondence\*

Okposio Mariere Matthias

Department of Paediatrics,  
Lily Hospitals Limited Warri,  
Phone Number: +2348034042120  
Nigeria.

Email: mattokmatok@yahoo.com.

at 100ml/kg via an umbilical catheter, intravenous ceftazidime, gentamicin and aminophylline, intranasal oxygen therapy. Surfactant and caffeine citrate which were needed for this infant were not readily available. His total serum bilirubin at 24 and 48 hours of life were 2.5mg/dl and 4.4mg/dl respectively for which he received double surface phototherapy. Unfortunately, his bilirubin continued to rise and reached to 6.2mg/dl on the third day of life, and the infant had a double volume exchange blood transfusion for it. Expressed breast milk via gavage was commenced on the sixth day of life after respiratory distress resolved and was well tolerated. The infant remained stable until the thirteenth day of life when she had series of apnoeic attacks presumably from hypoglycaemia (30mg/dl); she was promptly resuscitated and hypoglycaemia corrected. Results of the septic screen including complete blood count, blood culture, and cerebrospinal fluid analysis were normal thus antibiotics were discontinued. Cranial ultrasound scan done was normal and no evidence of intracranial haemorrhage or other pathology was found.

She subsequently had a fairly uneventful course and she was tolerating feeds well with no evidence of sepsis and necrotising enterocolitis. She was shifted outside special care unit with mother on 25th day where euthermia was strictly maintained by Kangaroo Mother Care along with gradual shifting to breast feeding. Baby showed progressive weight gain and was discharged healthy after 109 days with a weight of 2kg. Presently, the infant is 12 months old, weighs 8200grams and has attained developmental milestones within the range of normal for age.

### DISCUSSION

Each year 15 million babies are born preterm and their survival chances vary dramatically around the world.<sup>[5]</sup> For the 1.2 million babies born in high income countries, increasing complexity of neonatal intensive care in the last quarter of the 20th century has changed the chances of survival at lower gestational ages.<sup>[6]</sup> In low income countries on the other hand, survival of preterm infants is still a big challenge, more so in Nigeria where many hospitals both public and private still lack the requisite facilities and personnel to manage preterm infants.<sup>[4]</sup>

Like most preterm infants in Nigeria, our patient did not have the benefit of cutting-edge neonatal intensive care facilities, such as mechanical ventilators, nCPAP, and surfactant therapy. The key to our patient survival was doing the basics in spite of the



**Figure 1: Photograph of the baby taken at 7 days old**

obvious challenges. Temperature regulation was achieved by nursing in the incubator and later by kangaroo mother care (KMC). Prevention and management of hypothermia is one of the key interventions for reducing neonatal mortality. According to UNICEF, such interventions can help reduce neonatal mortality by 18%-42%.<sup>[7]</sup> Despite this recognition, hypothermia remains a significant challenge for practitioners to manage, especially in the perinatal care of preterm infants.<sup>[8]</sup>

Respiratory distress in our patient posed a very serious management challenge more so because of the non availability of surfactant, CPAP machine or a neonatal ventilator which are standard tools for the treatment of respiratory distress syndrome in preterm infants. However, with just humidified oxygen by nasal prongs given at 2litre/minute, our patient's oxygen saturation was maintained at between 85-90%. Perhaps, the use of antenatal steroids mitigated the impact of the respiratory morbidity in our patient.

Another challenge we encountered in the course of managing our patient was apnoeic spells which occurred on the thirteenth day of life apparently from hypoglycaemia. Although, we were able to identify a likely cause, apnoea of prematurity is also a common morbidity in premature infant even though it was less likely in our patient considering the time of onset. The preferred approach to treatment is a combined use of assisted ventilation (mechanical ventilator or nCPAP) and medications like methylxanthines while also addressing the cause. In the absence of equipment to deliver sustained positive pressure ventilation, only medication was used. Caffeine citrate is the preferred drug for treating because its wider therapeutic margin, longer half-life, fewer adverse effects and greater ease of administration compared to other methylxanthines.<sup>[9]</sup> However, in our patient, intravenous aminophylline was used because that was the only methylxanthines available to us at that time. Thankfully, our patient never had apnoeic attacks again till discharge

Premature babies are at increased risks of jaundice as well as infection and these may occur together compounding risks for death and disability.<sup>[10]</sup> The use of prophylactic phototherapy was adopted for our patient in ignorance of available evidence. Expectedly, this did not prevent a rise in the serum bilirubin necessitating an exchange transfusion. The effectiveness of our phototherapy may also have been affected by the inevitable distance between the infant and the phototherapy unit imposed by the incubator. The effectiveness of phototherapy is dependent on the irradiance, which in turn is partly affected by the distance



**Figure 2: Photograph of the baby taken at 10 months old**

between the newborn and the phototherapy unit.<sup>[11]</sup> Total serum bilirubin was 6.2mg/dl (>1% of the infant's body weight in grams) when the exchange transfusion was done. Recent studies of large populations of extremely low birth weight infants suggest an association between neurodevelopmental impairment and modest elevation of serum bilirubin.<sup>[12]</sup>

Although, infection is a major concern in preterm infants, our patient had a sepsis free stay in the neonatal unit thanks to the hygienic disposition of the managing team especially the nursing staff. Hand washing and other hygiene practices such as individualised equipments, maintaining a clean environment, meticulous cord and skin care were unit routines that positively impacted on the survival of our patient. The antibiotics started at birth for our patient was based on previous reports of increased risk of early onset septicaemia in infants of preeclamptic mothers.<sup>[13]</sup> These were however promptly discontinued when results of sepsis screen returned negative.

Feeding in the extreme preterm infant is often a challenge for several reasons. They are more likely to aspirate because of poorly developed coordination of suck and swallow process which only start at about 34 weeks.<sup>[14]</sup> They are also likely to have intolerance to feeds and also at greater risk of developing necrotising enterocolitis.<sup>[15]</sup> Our patient had intolerance to the feeds in the first one week, during which time she was on intravenous dextrose saline infusion. A total parenteral infusion would have sufficed at this stage, but this was not readily available. Our patient started tolerating the expressed breast milk on the 8th day of life and continued to do so until discharge.

This case has shown that without very high level equipment, it is still possible to save very tiny babies. Therefore, while we look forward to having cutting edge technology in the field of neonatology, starting with intensive care will fail if simple use of antenatal steroid, hygiene, careful attention to feeding and

keeping the baby warm by Kangaroo Mother Care and other basic building blocks are not in place. According to the World Health Organization, many countries cannot afford to rapidly scale up neonatal intensive care but no country can afford to delay doing the simple things well for every baby and investing extra attention in survival and health of newborns especially those who are preterm.<sup>[16]</sup>

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