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Survival of an Extremely Premature Newborn Weighing 500g at Monkole Hospital : an unusual case report

Survie d'un nouveau-né extrêmement prématuré de 500 g au Centre Hospitalier Monkole : une observation clinique inedite

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Résumé
La survie d'un nouveau-né de 500 g demeure un challenge, souvent associée à de multiples interventions. Le nouveau-né est né par voie basse à 26 semaines et 5 jours d'aménorrhée. À la naissance, le nouveau-né présentait une anémie sévère ayant nécessité une transfusion sanguine. Son séjour en soins intensifs a été marqué par des épisodes d'apnée et une infection. Le succès de la prise en charge a été principalement dû à une excellente tolérance et assimilation du lait maternel, ainsi qu'au strict respect des mesures d'asepsie. Le nourrisson a pu quitter l'hôpital après 75 jours. Ce cas illustre les progrès réalisés dans la prise en charge des grands prématurés en République démocratique du Congo.

Mots-clés : Néonatologie, Prise en charge, Soins Intensifs
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Summary
The survival of new-borns with 500 grams remains exceptional and is often associated with multiple interventions. This baby was delivered at 26 weeks and 5 days of gestation, with a birth weight of 500 g. At birth, the new-born presented a severe anemia requiring a blood transfusion. The passage in intensive care was marked by apnea and infection. The success of the management was mainly due to excellent tolerance and assimilation of breast milk, as well as strict adherence to aseptic measures. The infant was discharged after 75 days. This case illustrates the progress made in the management of extremely premature infants in the Democratic Republic of the Congo.

Keywords: Neonatology, management, Intensive care
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Introduction

The survival of extremely premature infants in Africa remains a major challenge. The birth of a new-born, weighing 500 grams, represents one of the most extreme challenges in modern medicine. In sub-Saharan Africa, their survival outcomes are particularly poor due to limited resources (1). The prevalence of preterm birth in the Democratic Republic of Congo (DRC) is the highest in Africa, with an estimated 11.5% of all births being preterm (2). The neonatal mortality rate was reported to be at 24‰ for neonatal mortality and 32‰ for postneonatal mortality (3).

Case Presentation

A female newborn, referred to as Patient N, was delivered at Monkole Hospital Center at 26 weeks and 5 days of gestation, with a birth weight of 500 g. She was born to a Congolese family with no known genetic or chronic

conditions. The parents were informed of the limitations of neonatal care available in the country. Despite these constraints, all possible efforts were made to optimise the infant's chances of survival.

The mother, a 27-year-old primigravida with a three-year history of infertility, had a blood type of B Rh-positive (table 1), and no other significant medical history. Early obstetric ultrasounds confirmed a viable, singleton pregnancy. However, uterine myomas were also detected. She received folic acid and iron supplementation throughout pregnancy. Between 15 and 19 weeks of gestation, she was treated for malaria (table 1), with Artemether and a urinary tract infection (table 1), with Cefixime.

Tableau 1. Mother's analyzes

Analyzes	**Analyzes**
Toxo : IgG4,07UI, IgM 0.971 UI	RPR negative
CMV: IgM 0.636IgG 465.3 UI	**Ag VHB** negative; **Ac anti HBC** negative
Paludism test	**Glycemia** 70 mg/dL
Determine negative	**CRP** 14.44 mg/L
Thick drop negative TDR positive	**SU** GB 136000 cells/mm^3
Urine	CE 90-91/Ch
Protein+	
Ketone++ Nitrite positive	
pH 6	
Sugar negative	
WBC 4580 cells/mm^3	
FL N61.7, L23.4 M14 E0.9B0%, PLT 205000 cells/mm^3	
Hematocrit 40.2%	

The mother took one episode of malaria and urinary infection during this pregnancy

At 21 weeks and 5 days, ultrasound estimated fetal weight at 363g, with normal morphology. Three days prior to delivery, she was admitted with lumbopelvic pain and premature rupture of membranes. On admission, her blood pressure was 124/90 mmHg,
heart rate 100 bpm, and temperature 36°C. Clinical and laboratory assessments confirmed membrane rupture and urinary tract infection. She was treated with Ceftriaxone and she received antenatal corticosteroids, Bethamethasone (12 mg/day IV for 48 hours). At 26 weeks and 2 days, ultrasound estimated fetal weight at 601g. The neonate was delivered vaginally after three days of hospitalization, with Apgar scores of 8/9/9, a head circumference of 19 cm(<P10), length of 26 cm(<P10), and a birth weight of 500g (<P10). Immediately after birth, the newborn was admitted to the neonatal intensive care unit (NICU). She was placed on non-invasive ventilation, "Nasal Continuous Positive Airway Pression (nCPAP)" with an initial fraction of inspired oxygen (Fi O_2) of 60% and a positive end-expiratory pressure (PEEP) of 5 cm H_2O for one week, which was gradually reduced over the following weeks. She was later transitioned to oxygen therapy via nasal cannula for 21 days. Caffeine therapy was administered for 10 weeks. At birth, her hemoglobin level was 9.5 g/dL (table 2), necessitating her first blood transfusion. Intravenous fluids included Pediaven I and II which are intravenous solutions composed of carbohydrate, amino acids, calcium and other electrolytes. Total fluid intake was progressively increased from 80 ml/kg on day 1 to 120 ml/kg/day. She received antibiotic therapy for 14 days (Cefotaxime 40 mg three times daily for 10 days and Amikacin 5 mg daily for three days).

Tableau 2. Baby's analyzes

Day 1	Hémogramme WBC 5.92 N1.96 L3.40 M0.48 E0.01 B0.01 PLT 152000 cells/mm^3 VGM 121.4; Hb 9.5 g/dL Hematocrit 30.2%	Day 1	CRP 0.19 mg/L
Day 1	Urée 17.9 mg/dL Créatinine 0.5 mg/dL	Day 1	GS O Rh positive
Day 1	Na 129 mmol/L K 4.6 mmol/L Ca 1.20 mmol/L		
Day 4	BT 18.7 mg/dL BD 0.04 mg/L	Day 4	CRP 0.57 mg/L
Day 4	WBC 11.89 FL N4.44 L5.08 M1.84 E 0.54 B 0.02 PLT 409000 cells VGM 82.6 Hb 14.5g/dL		
Day 48	CRP 63.19 mg/L	Day 55	0,5 mg/L

The baby had anaemia at birth and one episode of infection with a pathologic CRP

Enteral feeding was initiated on day 2 of life using expressed breast milk, starting at 1 ml every three hours and increasing progressively. Continuous feeding was introduced when the intake reached 5 ml per meal. At 15 ml per meal, soybean oil supplementation was added. Formula milk was introduced at six weeks of life, combined with a prokinetic agent (Erythromycin 10 mg/kg/day). She achieved a feeding volume of 180 ml/kg/day by day 15.

During hospitalization, the infant experienced two episodes of apnea, which were managed with caffeine and nCPAP. On day 47, elevated C-reactive protein (CRP, 63.19 mg/dL) (table 2), indicated infection, prompting additional antibiotic therapy with Cefotaxime (60mg three times daily for 7 days), Ciprofloxacin (10mg twice daily for 5 days), and Gentamicin (5mg/day for 3 days). Jaundice during the first week of life, had been treated with conventional phototherapy. The infant received four blood transfusions during hospitalization.

She was discharged after 75 days, at 37 Weeks, weighing 1,600g(<P10). At 15 days post-discharge, her weight was 2,600g(<P10), and at 2 months corrected age, she weighed 3,000g(<P10), cranial perimeter at 36 cm(≤P10) and 48 cm (<P10) of height. She spoke her first word, "papa", at nine months corrected age and achieved independent walking at 15 months corrected age.

Discussion

This rare case highlights the significant challenges associated with extreme prematurity and extremely low birth weight in our country. Born at 26 weeks and 5 days of gestation with a birth weight of 500g, the infant survived without severe respiratory or gastrointestinal complications. Despite limited resources in the neonatal unit, favourable outcomes were achieved through careful clinician management.

With the neonatal unit still limited in high biomedical technology and financial constraints, we have not yet systematically implemented all preventative examinations. We perform cardiac and transfontanellar ultrasounds based on clinical presentation, to avoid complications associated with these technical procedures, as we do not yet have a fully trained team. Nevertheless, ongoing efforts are being made to improve staff training and neonatal care capacity.

A key factor contributing to the positive outcome was strict adherence to aseptic measures. Nursing care included meticulous handling techniques, separate linen management and comprehensive family education on infection prevention. The Center for Disease Control and Prevention (CDC) and other national scientific organisations have issued evidence-based guidelines to improve Central line associated bloodstream infections (CLABSI). These are 5 key best practices that require full compliance in order to reduce risk:

1) Focus on sterile barrier precautions during PICC insertion (mask, sterile gown, sterile gloves and large sterile drapes)

2) Hand hygiene
3) Skin preparation with an antiseptic
4) Dressing changes when dressing becomes bloody, soiled or no longer occlusive
5) Daily review of line necessity with immediate removal of unwarranted lines (4).

Extremely low birth weight (ELBW) neonates are particularly vulnerable to bacterial infections because of developmental immaturities in the immune system, need for prolonged hospitalisations, and requirements for invasive monitoring, testing and treatments which bypass skin barrier defence mechanisms (5).

Another important contributor to success was the early tolerance of enteral feeding with human milk. Feeding volumes were increased without difficulty, by using continuous and the discontinuous feeding methods, with the help of a syringe pump. Human breast milk is considered the gold standard for infant nutrition. Beyond its nutritional benefits, breastfeeding has a potential to offer protective effects against respiratory and gastrointestinal complications such as infections. In preterm infants, exclusive human milk feeding is also associated with improved neurodevelopmental outcomes and reduced risk of Necrotic Enteral Colitis (NEC) (6).

The newborn was both extremely premature and small for gestational age. Several factors contributed to this severe preterm birth, including malaria, urinary tract infection, and uterine myomas. Malaria during pregnancy is strongly associated with prematurity and small-for-gestational-age (SGA) infants, defined as those born with a birth weight below the 10th percentile for gestational age and sex (7). In pregnant women, malaria leads to the massive sequestration of Plasmodium falciparum-infected red blood cells at the placental level, causing maternal anemia and increasing the risks of spontaneous abortion, miscarriage, preterm birth, and intrauterine growth restriction. These complications contribute to significant neonatal mortality (7).

The administration of antenatal corticosteroid therapy to mothers at risk of preterm birth has long been associated with a reduction in neonatal mortality. A recent Cochrane review confirmed that antenatal corticosteroids (ACS) decrease perinatal mortality, severe morbidities, and the need for respiratory support (8). Glucocorticoids accelerate the maturation of type 2 pneumocytes, induce the expression of pulmonary beta receptors, and contribute to alveolar structural development, vascularization, and surfactant production. Studies in both animal models and human neonates have demonstrated that glucocorticoids improve lung compliance and volume, thereby enhancing the effectiveness of exogenous surfactant treatment (9). However, as emphasized in WHO guidelines, ACS alone is insufficient; preterm infants require comprehensive supportive care, including thermoregulation, appropriate nutrition, and oxygen therapy when gestational age is below 32 weeks, often necessitating respiratory support (1).

Non-invasive positive pressure oxygenation via nasal prongs is a widely used and effective strategy for managing respiratory distress in preterm infants, as it is associated with reduced pulmonary morbidity (10). Studies conducted in developing countries have demonstrated that the absence of CPAP use, is strongly correlated with increased neonatal mortality in the extreme premature babies, while its use reduces both respiratory and non-respiratory complications (10).

In this case, higher oxygen requirements during the first week of life (FiO_2 up to 60%) were likely related to the unavailability of surfactant therapy, which is not currently included in the list of essential medicines in the DRC. She presented with cyanosis and desaturation during the reduction phase in the first week**.** Today, we don't have the means to perform blood gas analysis by micromethod in order to limit anaemia due to untimely sampling.

Conclusion

Although management was constrained by limited financial and technical resources such as a lack of extensive investigations, specifically bacteriology and neurological imaging, the present case shows progress in the care of extremely premature infants in the Democratic Republic of Congo. Effective organization allows for favourable outcomes despite limited resources: Strict aseptic practices and the implementation of WHO-recommended respiratory interventions, such as antenatal corticosteroids and CPAP, has significantly improved preterm infant survival rates. Expanding access to these interventions in developing countries could further reduce neonatal morbidity and mortality. The case illustrates the potential for continued

improvement in neonatal outcomes with targeted interventions and capacity building.

Conflict of interest

The authors have no conflict of interests to declare

Author's contributions

We are part of paediatric and obstetric team of Monkole hospital. G.K: contributed to prepare literature and wrote the manuscript; as well as submitted final version. M.J: Contributed to prepare literature search. M.M: Contributed to critically revised, M.K: participate to writing and G.A; participated at writing of manuscript, revised the manuscript; approved the submitted and final version.

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