



# Role of Delayed Cord Clamping in Limiting Blood Transfusion in Preterm Babies': A Series of Three Nigerian Cases

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## Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Study

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## ABSTRACT

The management of preterm babies are usually challenging with one significant issue being anaemia, which often requires multiple blood transfusions and their associated complications. Delayed cord clamping during delivery have been identified as a proactive measure to reduce the need for multiple blood transfusion in preterm babies. We present three case series of preterm babies delivered and managed with intentional

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delayed cord clamping [DCC], to strengthen the advocacy for the practice particularly in developing and less developed nations where blood transfusion facilities and practice may be inadequate.

*Keywords: Blood transfusion; preterm; delayed cord clamping.*

## 1. INTRODUCTION

Preterm delivery is increasing worldwide, including in sub-Saharan Africa, due to factors such as assisted reproductive technologies, increased maternal age, multiple pregnancies, low socioeconomic status, and infections [1]. Millions of infants are born prematurely yearly, with over 80 percent occurring in the low-and -middle-income countries [LMICs] [2,3]. Prematurity is a significant contributor to the high neonatal mortality rate globally [1,2]. Managing preterm babies presents several medical challenges, especially in resource-poor nations due to a dearth of skilled manpower and infrastructure. These challenges include but are not limited to anaemia and the need for multiple blood transfusions, which carry additional complications [4,5]. Various physiological factors related to prematurity and extrinsic activities like phlebotomy blood loss for laboratory testing increase the prevalence of anaemia and the high rate of blood transfusions often observed in preterm management [6]. There have been concerted efforts by neonatologists to minimize the sources of the blood loss in the preterm, and when indicated to transfuse more conservatively. Delayed cord clamping [DCC] during delivery has been identified as one of the proactive measures that will reduce the need for blood transfusion in preterm babies [7]. The importance of DCC was buttressed by the findings of a systematic review of 2834 infants in 18 trials, which concluded that DCC by at least 60 secs reduces mortality in preterm (95% CI- 0.52-0.91, p=0.009) [7]. Here, we present a case series of preterm low birth weight babies managed in a private specialist paediatric hospital in Imo State, Southeast Nigeria, with intentional DCC and conservative blood sampling for investigations.

## 2. CASE PRESENTATIONS

Case1- Baby OU, born at 29 weeks 5 days gestational age via an emergency caesarean section due to abnormal umbilical artery doppler velocimetry had DCC for 45 seconds. The mother received 2 doses of intramuscular dexamethasone prior to delivery. She is a diabetic and has had previous histories of

spontaneous abortions. At birth, the baby weighed 1.08kg, had respiratory distress but was pink in room air with a respiratory and heart rate of 52/m and 144/m respectively. The blood sugar was 41mg/dl. The admitting diagnosis was severe preterm Infant of a Diabetic mother with respiratory distress. The baby was nursed in the incubator and commenced on prophylactic phototherapy, IV Aminophylline, 10% Dextrose water, IV antibiotics [prophylaxis]. The hematocrit at admission was 55%, 10<sup>th</sup> day of life [DOL] was 54%, 8weeks and 13 weeks 25% and 28% respectively. Oral hematinics was commenced at 4 weeks of age and continued. He was not transfused and was discharged after 40 days with a weight of 1.26kg. He is still on follow up and has been seen 6 times so far since discharge with no need for transfusion. Weight at 11 weeks post discharge was 3.7kg.

Case 2- Baby UO was born at gestational age of 27weeks 4 days via an emergency caesarean section [due to drainage of liquor] weighing 975grams with DCC for 60 secs. Admitting diagnosis was extreme prematurity with extreme low birth weight. The baby was active with occasional grunting, plethoric and had a heart and respiratory rate of 138/m and 54/m respectively. Incubator care and intranasal oxygen via an improvised Continuous Positive Airway Pressure was initiated. She also received IV Aminophylline, antibiotics, intravenous fluid. Prophylactic phototherapy was commenced. Hemoglobin concentration at birth was 17g/dl. She was completely weaned off oxygen on the 15<sup>th</sup> DOL and was discharged after 53 days of admission and has been seen twice after discharge. Oral hematinics and multivitamin was commenced on the 36<sup>th</sup> DOL and continued at home after discharge.

Case 3- Male twins. Baby IH were born at 28 weeks 3 days gestational age via an emergency caesarean section due to premature drainage of liquor. The woman who had a history of primary infertility of 5 years. The birth weights were 1.08kg and 1.2kg for the 1<sup>st</sup> and 2<sup>nd</sup> twins respectively, with DCC of 60 seconds each. At delivery they were active but in respiratory distress, scrotum was empty. They received IVF,

IV Aminophylline, IV antibiotics, intra nasal oxygen, prophylactic phototherapy and expressed breast milk was commenced on the 4<sup>th</sup> day of life. The 2<sup>nd</sup> twin was later placed on nil per oral due to food intolerance, 16<sup>th</sup> DOL PCV was 45% and 51% for the 1<sup>st</sup> and 2<sup>nd</sup> twin respectively. They were started on syrup hematinics and multivitamin and were discharged on the 46<sup>th</sup> DOL, with a weight of 1.49kg and 1.42kg for the 1<sup>st</sup> and 2<sup>nd</sup> twin respectively. They have been followed up till 6 months of age with no need for blood transfusion. Repeat hematocrit at discharge and second follow up was 34% and 38% respectively for the 1<sup>st</sup> twin and 38% and 35% respectively for the 2<sup>nd</sup> twin.

### 3. DISCUSSION

Neonates, particularly preterm babies, experience a decline in circulating red blood cells in the early months of life [6]. This decline occurs earlier in preterms (4-6 weeks) than in term babies (10-12 weeks), often necessitating RBC transfusions in preterm infants [6]. Effective care of preterm babies thus involves reducing the need for blood transfusions [8].

DCC for infants not requiring immediate resuscitation has been shown to reduce the need for transfusions in preterm infants [7] Rabe et al. [9] in a systematic review to assess the short- and long-term effects of early rather than delaying clamping or milking of the umbilical cord for infants born at less than 37 completed weeks' gestation, and their mothers, concluded that DCC was associated with fewer infants requiring transfusion during the hospital stay besides other benefits and thus posited that DCC should be performed in all preterm infants who are not in immediate need of resuscitation. Ghavam et al. [10] likewise in a meta-analysis noted that one of the short-term benefits of DCC at birth was the reduced number of blood transfusion given in ELBW preterm [95%, CI -2.52 to -1.92,  $p < 0.001$ ]. Tewari et al. [11] in a prospective study in India also noted that DCC reduced the incidence of hemodynamic instability and respiratory distress in preterm babies 25-35 weeks.

Although arguments exist as to what constitutes DCC but most authorities agree that cord clamping that occurs greater than 1 minute after birth or when cord pulsation has ceased qualifies as DCC [12,13]. It is thus defined as intentionally deferred clamping of the newborn's umbilical cord for at least 60 seconds to allow transfusion with placental blood [12,14]. The placental transfusion occurs when infants are held below

the introitus or uterus level during caesarean section for a variable period. In an exploratory survey in Lagos by Ubane et al. [15] among skilled birth attendants it showed that although 76.4% of the respondents were aware of DCC only about half that number practiced it with a range of time 30secs to greater than 3minutes. Also, Payne et al. [16] in a multicenter study which included Nigeria, reported that only about 60% of obstetric and neonatal practitioners who were involved in the study practiced DCC [greater than 60secs before cord clamping] for stable preterm delivery. Moreso 29% of those who practice it, do because they were taught to do it that way and not necessarily because they know the various clinical benefits.

Besides the reducing the need for blood transfusion, DCC in preterm has been found to be associated with lower risk of intraventricular hemorrhage, necrotizing enterocolitis, late-onset sepsis and decreased need for surfactant and mechanical ventilation [9,10]. Although DCC may increase peak bilirubin concentration, there was no significant difference in jaundice treatment between DCC and early clamping groups. Prophylactic phototherapy likely prevented jaundice in our cases. All cases presented, except Case 3, had relatively event-free hospital stays without transfusions. Case 3 had feed intolerance but improved after treatment.

The benefits of DCC are particularly significant in the management of preterm in low and medium-income countries [LMICs] given the challenges of blood banks and donation and the high neonatal mortality rates recorded. Inconsistent DCC practices among healthcare practitioners can be attributed to a lack of guidelines and awareness, perceived non-feasibility of the practice while the Obstetric team is still operating, and the reluctance to change an old habit thus highlighting the need for the development of guidelines [16,17]. Chan and colleagues [13] in an interventional study aimed at improving the rate of DCC practice in their facility observed that education to improve the knowledge of caregivers about DCC, dissemination and publication of updated DCC protocols, predelivery planning like use of checklists, and real time decision making were part of the tools that improved the rate of DCC by over 50%.

### 4. CONCLUSION

The rate of preterm deliveries is expected to increase even in sub - Saharan Africa

consequent on the proliferation of fertility clinics amongst other factors. Thus, as a practical cost-effective way of improving the general health outcome of these babies and reducing the need for blood transfusion, we advocate for a scale-up of the practice of DCC in our hospitals as well as re-education of healthcare workers on the benefits of DCC and the need for them to implement it. This if done shall have tremendous positive impact in the management of preterm neonates in health resource- constrained nations like ours.

### DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Authors hereby declare that NO generative artificial intelligence technologies have been used during writing and editing this manuscript.

### CONSENT

As per international standards or university standards, respondents' written consent has been collected and preserved by the author(s).

### ETHICAL APPROVAL

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

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### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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