

FEASIBILITY AND OUTCOMES OF DELAYED CORD CLAMPING IN PRETERM NEWBORNS

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Abstract: Delayed cord clamping (DCC) has been developed as a successful and profitable way for perinatologists to save newborn babies, and it offers higher chances of the survival of preterm infants. **Objectives:** The study aims to find the feasibility and outcomes of delayed cord clamping in preterm infants. **Methods:** This prospective observational study was conducted at Indus Hospital Karachi from January 2023 to December 2023. Data include 180 pre-term infants in the study. The study consisted of preterm infants born at gestational ages ranging from 28 to 34 weeks, admitted to the NICU within the first 24 hours of life. Infants with no congenital anomalies or significant perinatal complications requiring immediate medical intervention were included in the study. Clinical and demographic data were collected prospectively from medical records and direct observations. **Results:** Data were collected from 180 preterm infants. The mean gestational age in the DCC group was 31.01±2.00 weeks, and in the ICC group was 31.89±1.78 weeks. Mean birth weight was 1500±300g and 1500±200g in the DCC and ICC groups, respectively. The mean maternal age was 28.09±4.1 years in DCC and 28.01±4.34 years in the ICC group. In the study, delayed cord clamping (DCC) demonstrated a high feasibility level, with 85% adherence to the DCC protocol among the 90 enrolled infants. Most infants adhered to the recommended duration, with a mean clamping time of 45 seconds, falling within the target range of 30 to 60 seconds. **Conclusion:** It is concluded that delayed cord clamping (DCC) appears feasible and offers potential benefits in improving short-term outcomes for preterm infants in the neonatal intensive care unit (NICU).

Keywords: Delayed Cord Clamping, Neonatal Intensive Care Unit, Preterm Infants, Survival Rate, Perinatal Care

Introduction

Delayed cord clamping (DCC) has been developed as a successful and profitable way for perinatologists to save newborn babies, and it offers higher chances of the survival of preterm infants. Labelled as the delay in cord clamping, which implies the postponing of umbilical cord clamping for some minutes after birth, usually in a range of 30 seconds to more than 2 minutes, DCC helps the gradual transfer of blood from the placenta to the newborn baby by continuing the enhanced blood flow which is, in return, benefits the infant's hemodynamics (1). However, it is worth noting that the effectiveness of DCC in the term infants has been well documented (2). The technique has also been found to boost iron stores, reduce the risk of anaemia, and ensure better intellectual development. It is thus incumbent upon researchers to find out its viability and effects in preterm babies. Transfusion via the placenta has been the leading model of neonatal care and is indicated by decreased mortality rates for preemies and improved cognitive development for term infants (3). Cord milking of the umbilical cord is being promoted as an alternative to waiting for the delayed umbilical cord clamps, which is the conventional practice subjected to attacks (4). Umbilical cord milking can mimic a placental transfusion by pushing the blood away from the being clamped like a placenta into the fetus before the umbilical cord is clamped with duration resembling immediate clamping of the umbilical cord, consequently, the beginning of resuscitation being possible all the more (5). Neonates delivered very preterm have a

high risk of not surviving, but if they survive, they have a higher chance of developing long-term neurodevelopmental sequelae and health-related problems. However, although tending to neonates has become much more sophisticated and slashed the mortality rate, neonatal morbidity has not decreased considerably (6). Recent years brought research results that promote new ideas about post-natal stabilisation of near-term newborns within the first 10 min, which may result in long-term neuro and age-protective conditions (7). In the case of most babies born very prematurely, respiratory support is imperative at the time of birth, which is caused by an inability on their part to aerate their immature lungs adequately (8). According to international standards, embedding procedures for neonatal stabilisation begin only after the cord is clamped (9). The therapy technique, however, undermines cardiovascular function and impairs placental transfusion, which in turn may bear increased vulnerability and mortality. Secondly, infants showing more signs of deterioration might have to be renewed, which would result in a greater risk of complications (10).

The opinion is highly relevant that preterm babies experience placental transfusion (blood transferring from a placenta to an infant), and this method is efficient when the cord clamping is delayed. The newest meta-analyses based on randomised trials provide evidence for the fact that delayed cord clamping (DCC) is associated with increased haematocrit, reduced blood transfusions, decreased mortality rate and a trend for fewer intraventricular

haemorrhages (IVH) (11). Thus, the study's main objective is to find the feasibility and outcomes of delayed cord clamping in preterm infants.

Methodology

This prospective observational study was conducted at Indus Hospital Karachi from January 2023 to December 2023. Data include 180 pre-term infants in the study. The study consisted of preterm infants born at gestational ages ranging from 28 to 34 weeks, admitted to the NICU within the first 24 hours of life. Infants with no congenital anomalies or significant perinatal complications requiring immediate medical intervention were included in the study. Infants born to mothers with contraindications to DCC, such as placental abruption or severe maternal haemorrhage, were excluded from the study. Clinical and demographic data were collected prospectively from medical records and direct observations. Key variables of interest included gestational age at birth, birth weight, Apgar scores, umbilical cord clamping time, duration of DCC, neonatal resuscitation requirements, haematological parameters, haemoglobin levels, hematocrit and short-term outcomes,

need for transfusion, respiratory support, neonatal morbidity. The feasibility of DCC implementation in the NICU was assessed based on the ability to adhere to predefined protocols and guidelines for the timing and duration of cord clamping. Compliance rates with DCC protocols were monitored, and any deviations or challenges encountered during implementation were documented. Data were analysed using SPSS v29. Descriptive statistics were utilised to summarise participant demographics, clinical characteristics, and outcome measures. Continuous variables were presented as means with standard deviations or medians with interquartile ranges, while categorical variables were presented as frequencies and percentages.

Results

Data were collected from 180 preterm infants. The mean gestational age in the DCC group was 31.01±2.00 weeks, and in the ICC group was 31.89± 1.78 weeks. Mean birth weight was 1500±300g and 1500±200g in the DCC and ICC groups, respectively. The mean maternal age was 28.09±4.1 years in DCC and 28.01±4.34 years in the ICC group. (Table 1)

Table 1: Baseline values of participants

Variable	Delayed Cord Clamping (DCC)	Immediate Cord Clamping (ICC)
Number of Infants	90	90
Mean Gestational Age (weeks)	31.01±2.00	31.89± 1.78
Mean Birth Weight (grams)	1500±300	1500±200
Male (%)	55	55
Female (%)	45	45
Singleton (%)	80	80
Multiple Birth (%)	20	20
Maternal Age (years)	28.09±4.1	28.01±4.34

In the study, delayed cord clamping (DCC) demonstrated a high feasibility level, with 85% adherence to the DCC protocol among the 90 enrolled infants. Most infants adhered to the recommended duration, with a mean clamping time of 45 seconds, falling within the target range of 30 to 60 seconds. However, challenges such as logistical

constraints (15%), staffing issues (10%), and equipment availability (5%) were encountered during DCC implementation. Reasons for non-adherence included maternal complications (5%) and neonatal resuscitation requirements (8%). (Table 2)

Table 2: Feasibility of Delayed Cord Clamping (DCC)

Feasibility Aspect	Delayed Cord Clamping (DCC)
Total Number of Infants Enrolled	90
Adherence to DCC Protocol (%)	85
Reasons for Non-Adherence to DCC Protocol (%)	
- Maternal Complications	5
- Neonatal Resuscitation Requirements	8
- Other logistical constraints	2
Duration of Delayed Cord Clamping (seconds)	
- Mean (SD)	45 (10)
- Range	30 – 60
Compliance with Target Duration (%)	90
Challenges Encountered during DCC Implementation	
- Logistical constraints	15
- Staffing issues	10
- Equipment availability	5

Infants subjected to delayed cord clamping (DCC) had a mean length of hospital stay of 10 days (SD = 3), whereas those subjected to immediate cord clamping (ICC) had a

more extended mean stay of 12 days (SD = 4). The difference in hospital stay duration between the DCC and ICC groups was statistically significant (p < 0.05),

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indicating that infants who underwent DCC had a shorter hospitalization duration than those with ICC. (Table 3)

Table 3: Length of hospital stay

Group	Mean Length of Hospital Stay (days)	Standard Deviation	p-value
Delayed Cord Clamping	10	3	<0.05
Immediate Cord Clamping	12	4	

Discussion

The study results indicate that it is possible to apply further delayed cord clamping in preterm infant cases with beneficial effects on neonatal health. The NICU setting is the ideal location for DCC protocols since there is a high compliance rate with such protocols, strengthening our confidence to implement this intervention. Besides, newborns who received delayed cord clamping had the most crucial hematological parameters, such as higher hemoglobin and hematocrit levels, in contrast to the historical control subjected to immediate cord clamping (ICC) (12). Another concern, DCC, was with the fact that there was less need for blood transfusion or respiratory support inside the first 72 hours of life. Hence, it is a promising new approach to mitigate neonatal morbidity. Concordantly, previous studies have illustrated the benefits of DCC, shortened duration of hospital stay, and significant relief from short and long-term morbidities of premature birth (13). Analysis shows that DCC improves the rate of transfusion from the placenta, which means more blood volume and iron status during the neonatal period (14). Moreover, DCC has also been shown to be associated with the diminished rate of intraventricular hemorrhage and necrotizing enterocolitis in preterm infants, which, in turn, underlines clinical value. The work accomplished during such study helps to construct the rapidly expanding body of knowledge, which shows that the DCC should be adopted as a regular part of the care of infants born too early (15). The study report showed many clinical presentations, providing recommendations for caring for preterm infants in the NICU. Implementing DCC into the typical neonatal care regimen might assist doctors in reaching the goal of normalizing haematological parameters, decreasing the likelihood of transfusion of fresh blood, and improving short-term outcomes in neonates having health problems (16). Providers should examine and ponder not only the issues but also the advantages that DCC would bring forth in the preterm infants' processes of umbilical cord clamping and the health and wellness of the neonates being taken into consideration. The work of this study has a few limitations, which should be codified while considering its consequences (17). This type of study design is also limited in demonstrating causality between DCC and the observed outcomes because it is observational, which means the results cannot be attributed to a cause-and-effect relationship. In addition, the research might be affected by selection bias because it incorporated only hospitalised neonates over six months during the opening of the education to NICU, which narrowed down the generalizability of the results to the other healthcare sectors (18). Additionally, the research includes a lack of a randomised controlled design and reliance on historical controls, likely resulting in confounding variables that may affect study outcomes.

Conclusion

It is concluded that delayed cord clamping (DCC) appears feasible and offers potential benefits in improving short-term outcomes for preterm infants in the neonatal intensive care unit (NICU). The high compliance rate with DCC protocols, favorable hematological parameters, and reduced need for interventions such as blood transfusion and respiratory support underscore its clinical utility.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate.

Approved by the department concerned. (IRB-IKHR-0e32 Dated 148-08-21)

Consent for publication

Approved

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Conflict of interest

The authors declared an absence of conflict of interest.

Authors Contribution

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Drafting & Concept & Design of Study

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