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Original Research Article

Comparative Analysis of Early vs. Delayed Cord Clamping in Full-Term Deliveries

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Abstract:

Background: Cord clamping is a crucial step in the third stage of labor, influencing both neonatal and maternal outcomes. While early cord clamping (ECC) has been the standard practice, delayed cord clamping (DCC) is gaining recognition for its potential benefits.

Aim This study compares the effects of DCC and ECC on neonatal hemoglobin levels, incidence of neonatal jaundice, and maternal postpartum blood loss.

Material and Methods: A prospective comparative study was conducted on 200 term deliveries, with participants randomly assigned to ECC (clamping within 30 seconds) or DCC (clamping after 2–3 minutes). Neonatal hemoglobin and bilirubin levels were measured at 24 and 48 hours post-delivery, while maternal blood loss was assessed through postpartum hemoglobin changes.

Results: DCC significantly increased neonatal hemoglobin levels, reducing neonatal anemia incidence. However, neonatal bilirubin levels were slightly higher in the DCC group, leading to a moderate increase in jaundice cases requiring phototherapy. Maternal blood loss and postpartum hemorrhage rates were not significantly different between the two groups.

Conclusion: DCC provides substantial benefits in neonatal iron status while posing a manageable risk of jaundice. Given its advantages, DCC should be considered a routine practice with adequate neonatal jaundice monitoring.

Keywords: Delayed cord clamping, Neonatal anemia, postpartum hemorrhage.

Introduction

Cord clamping is a critical step in the third stage of labor, impacting both neonatal and maternal outcomes. Traditionally, early cord clamping (ECC) has been the standard practice, where the umbilical cord is clamped and cut within 30 seconds after birth. However, recent studies suggest that delayed cord clamping (DCC), where the cord is clamped after 1–3 minutes or when pulsations cease, may provide significant neonatal benefits [1].

One of the primary advantages of DCC is its positive impact on neonatal iron stores and hemoglobin levels. Studies indicate that placental transfusion during DCC allows an additional 30–50 mL of blood to flow to the newborn, increasing the total blood volume by approximately 30% [2]. This increase contributes to higher hemoglobin levels at birth and improved iron status for the first few months of life, reducing the risk of neonatal anemia [3]. Given the global burden of iron deficiency anemia in infants, particularly in low-resource settings, DCC may serve as a simple yet effective strategy to improve long-term neurodevelopmental outcomes [4]. Despite these advantages, DCC has been associated with a higher incidence of neonatal jaundice, requiring phototherapy in some cases. The additional red blood cells transferred during DCC break down into bilirubin, increasing the risk of hyperbilirubinemia [5]. This concern has led to debates among healthcare providers regarding the safety of DCC, especially in settings where phototherapy resources are limited [6].

From a maternal perspective, the main concern regarding DCC is its potential impact on postpartum hemorrhage (PPH). Some studies have suggested that delaying cord clamping may

increase maternal loss due to prolonged placental transfusion [7]. However, systematic reviews and meta-analyses have found no significant difference in maternal hemorrhage rates between ECC and DCC [8].

Given the ongoing debate surrounding cord clamping timing, this study aims to compare the effects of DCC versus ECC on neonatal hemoglobin levels, incidence of neonatal jaundice, and maternal postpartum blood loss. By evaluating both benefits and risks, this research provides evidence-based recommendations for optimal cord clamping practices.

Material and Methods

Study Design and Participants: A prospective comparative study was conducted on 200 pregnant women with term deliveries at a tertiary care hospital in South Gujrat. Participants were randomly assigned to either the early or delayed cord clamping group (100 in each).

Inclusion Criteria

- Term singleton pregnancies
- Vaginal deliveries
- No fetal anomalies or maternal disorders affecting placental function

Exclusion Criteria

- Preterm deliveries (<37 weeks)
- Multiple gestations
- Severe maternal anemia or pregnancy complications (e.g., preeclampsia)

Procedures

- **Early Cord Clamping (ECC):** Clamping performed within 30 seconds of birth.
- **Delayed Cord Clamping (DCC):** Clamping performed after 2–3 minutes or when cord pulsation ceased.

Neonatal hemoglobin and bilirubin levels were measured at 24 hours and 48 hours post-delivery. Maternal blood loss was assessed using the change in hemoglobin levels and estimation of postpartum hemorrhage.

Results

Table 1 shows DCC resulted in significantly higher neonatal hemoglobin levels at 24 and 48 hours compared to ECC. However, bilirubin levels were slightly higher in the DCC group, indicating an increased risk of neonatal jaundice.

Table 2 exhibits Neonatal Anemia were significantly lower in the DCC group. However, the incidence of jaundice requiring phototherapy was higher, though not statistically concerning.

Table 3 predicted drop in maternal hemoglobin and the incidence of PPH were slightly higher in the DCC group, but the difference was not clinically significant.

Table 1: Neonatal Hemoglobin and Bilirubin Levels at 24 Hours and 48 Hours Post-Birth

Cord Clamping Method	Neonatal Hemoglobin (g/dL) at 24h	Neonatal Hemoglobin (g/dL) at 48h	Neonatal Bilirubin (mg/dL) at 48h
Early Clamping (ECC)	14.2 ± 1.5	13.8 ± 1.3	8.5 ± 2.1
Delayed Clamping (DCC)	16.8 ± 1.7	16.2 ± 1.5	10.1 ± 2.4

Table 2: Incidence of Neonatal Anemia and Jaundice

Cord Clamping Method	Neonatal Anemia (%)	Neonatal Jaundice Requiring Phototherapy (%)
Early Clamping (ECC)	18%	5%
Delayed Clamping (DCC)	4%	12%

Table 3: Maternal Blood Loss and Postpartum Hemorrhage (PPH) Incidence

Cord Clamping Method	Mean Maternal Hemoglobin Drop (g/dL)	PPH Incidence (%)
Early Clamping (ECC)	1.1 ± 0.5	3%
Delayed Clamping (DCC)	1.3 ± 0.6	5%

Discussion

The findings of this study align with existing research that highlights the benefits of delayed cord clamping in improving neonatal outcomes. Our results demonstrate that neonates who underwent DCC had significantly higher hemoglobin levels at 24 and 48 hours post-birth compared to those who underwent ECC. This supports prior studies indicating that DCC increases neonatal iron stores, reducing the likelihood of anemia during infancy [1,2,3]. Additionally, research suggests that improved iron status in early life contributes to better cognitive function, motor development, and overall growth in childhood [4,5].

However, our study also found that DCC was associated with a modest increase in neonatal bilirubin levels, leading to a higher incidence of jaundice requiring phototherapy. This is consistent with findings from randomized controlled trials that have shown DCC increases the risk of hyperbilirubinemia [6,7,8]. Although bilirubin levels were elevated in the DCC group, the

majority of cases were mild and did not require extensive intervention. A review by the World Health Organization (WHO) has emphasized that while the risk of jaundice is present, it does not outweigh the benefits of improved iron status and reduced anemia [9].

Maternal outcomes showed no significant difference in postpartum hemorrhage rates between ECC and DCC, supporting previous findings that DCC does not increase maternal blood loss when combined with proper management of the third stage of labor [10,11,12]. Some studies initially suggested that prolonged placental circulation during DCC might contribute to increased bleeding [13]. However, recent meta-analyses have refuted this claim, showing that controlled cord traction and administration of uterotonic drugs can mitigate any additional bleeding risks [14,15].

Overall, the results of this study reinforce the growing body of evidence supporting DCC as a beneficial practice for term deliveries. The benefits of higher neonatal hemoglobin levels and reduced risk of anemia outweigh the manageable risk of neonatal jaundice. Given these findings, healthcare providers should consider implementing DCC as the standard practice while ensuring that appropriate jaundice monitoring and management protocols are in place.

Conclusion

This study highlights the benefits of delayed cord clamping (DCC) in improving neonatal hemoglobin levels and reducing the risk of anemia. While DCC is associated with a slightly higher incidence of neonatal jaundice, this risk is manageable with proper monitoring and treatment. Maternal outcomes, including postpartum hemorrhage, were not significantly affected by DCC. Given these findings, DCC should be considered a standard practice in term deliveries, with appropriate neonatal jaundice screening in place.

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