

THE STUDY OF MATERNAL OUTCOME FOLLOWING EARLY AND DELAYED CORD CLAMPING IN BIRTHS ASSOCIATED WITH ANEMIA IN PREGNANCY

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ABSTRACT

Objectives: (The objectives of the study are as follows: 1) To compare the Blood loss in both early cord clamping (ECC) versus delayed cord clamping (DCC) (in the third stage of labor). (2) To compare the third-stage complications following ECC versus of DCC in anemic pregnant females. (3) To compare Maternal hemoglobin and hematocrit at 24 h of delivery in both ECC versus DCC.

Methods: This prospective study was carried out in the Department of Obstetrics and Gynaecology in Lady Hardinge Medical College and Associated Hospitals, New Delhi pregnant women. A total of 120 anemic pregnant women between 32 and 40 weeks of gestation admitted in the labour room were enrolled in the study (hemoglobin between 7 and 10.9 g%). Twenty patients were lost to follow-up. Third-stage complications of 46 women who underwent ECC (<60 s) were compared with 54 women who underwent DCC (more than 60 s to <3 min). Maternal hemoglobin and hematocrit at 24 h of delivery were also compared between both groups.

Results: The mean blood loss in both the groups was 325±89.287 and 326.85±66.384, comparable statistically with p=0.906. Out of 100 patients enrolled, only two patients had postpartum hemorrhage. Each one belonged to each group (p<0.909). None of the groups had retained placenta showing no statistical significance between two groups (p<1). DCC was not associated with increased risk of third-stage complications whether in cesarean section or vaginal delivery. There were no differences in operative time, post-delivery decrease in hematocrit, rates of postpartum hemorrhage, bleeding complications, maternal blood transfusions, and therapeutic hysterectomy between the two groups.

Conclusions: DCC is safe for mother especially in anemic mothers also as it does not increase the mean blood loss and also it has beneficial effect on neonates. No difference in third-stage complications and maternal hemoglobin and hematocrit levels at 24 h in both groups. It should be recommended in routine practice where it is not contraindicated especially in resource-poor settings.

Keywords: asthma, heart disease.

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INTRODUCTION

AMTSL (Active Management of Third Stage of Labor) was introduced by the World Health Organization (WHO) in 1989, to decrease maternal mortality caused by postpartum hemorrhage (PPH) [1]. For the physiological transfusion, the timing of cord clamping varied from early cord clamping (ECC) DCC (<30 s) to DCC (>30 s till cord pulsation stops). DCC is recommended in term and preterm infants for the beneficial effects [2]. We aimed to compare the maternal bleeding complications following ECC versus of DCC in anemic pregnancies.

Recently, the American College of Obstetricians and Gynecologists (ACOG) published a committee opinion that supported DCC in preterm infants. Multiple systematic review and meta-analysis [3,4] had reported that DCC improved hemodynamic outcomes and reduced hospital mortality, which supported current guidelines recommending DCC in preterm infants.

Aim and objective

1. The aim of this study was to compare third-stage complications including third-stage blood loss, postpartum hemorrhage, and retained placenta in the mother following early versus DCC in the active management of third stage of labor in births associated with anemia in pregnancy.

2. Maternal hemoglobin and hematocrit at 24 h of delivery in both the groups ECC versus DCC.

The study was conducted in the Labor room of Department of Obstetrics and Gynecology in Lady Hardinge Medical College and associated hospitals, New Delhi.

MATERIAL AND METHODS

Inclusion criteria

Antenatal women with the period of gestation between 32 and 40 weeks admitted in labor room with anemia (hemoglobin between 7 and 10.9 g%).

Table 1: Comparison of maternal demographic and clinical parameters in study groups

Mean	ECC (n=46)	DCC (n=54)	p
Parity (including study child)	2.1	2.074	0.783
Age±SD (years)	25.04±3.340	24.04±3.325	0.135
Height±SD (cm)	152.54±2.639	152.39±2.831	0.780
Weight±SD (kg)	53.16±6.715	52.52±5.403	0.596
BMI±SD (kg/m ²)	22.8±2.18	22.48±1.99	0.388
Number of booked	33	44	0.249
Number of Unbooked	13	10	

SD: Standard deviation, BMI: Body mass index, ECC: Early cord clamping, DCC: Delayed cord clamping

Table 2: Comparison of maternal Hb, hematocrit, and serum ferritin levels in the study groups

	Maternal Hb 7-9.9 (Group A)			Maternal Hb 10-10.9 (Group B)			Total		
	ECC (n=25), mean±SD	DCC (n=31), mean±SD	p	ECC (n=21), mean±SD	DCC (n=23), mean±SD	p	ECC (n=46), mean±SD	DCC (n=54), mean±SD	p
Hb	9.10±0.446	9.097±0.482	0.98	10.305±0.229	10.461±0.255	0.039	9.65±0.7055	9.678±0.781	0.854
Hematocrit	27.58±1.18	27.63±1.449	0.884	31.086±0.748	31.648±1.16	0.067	29.178±2.03	29.341±2.40	0.719
Ferritin	10.50±7.77	10.45±10.9	0.982	14.25±11.2	18.53±16.1	0.317	12.21±9.57	13.89±13.88	0.479

t-test, Chi-square test. SD: Standard deviation, Hb: Hemoglobin, ECC: Early cord clamping, DCC: Delayed cord clamping

Exclusion criteria

The following criteria were excluded from the study:

1. Pregnant women with any medical disorders including
 - a. Known case of diabetes, hypertension, asthma, heart disease, any thyroid disease, kidney disease, or liver disease.
 - b. Rh negative pregnancy.

Third stage was actively managed/5 fr: 10 unit oxytocin was given intramuscularly after the delivery of baby/placenta.

Timing of cord clamping in anemic pregnant women was observed and recorded using stopwatch. ECC group included cord clamping within 1 min and DCC group included cord clamping more than 1 minute/till cord pulsation ceased.

Placenta was delivered by controlled cord traction. Amount of blood loss was noted by collecting the blood directly into the receptacle from the rubber sheet spread below the patient.

Vulva, vagina, and perineum were inspected. Placenta and membranes were checked for their completeness. Any third-stage complications including retained placenta or postpartum hemorrhage were noted.

Postpartum

Vitals were monitored. Uterine contraction/retraction, amount of vaginal bleeding was noted.

Timely initiation of breastfeeding was ensured according to the comfort and health status of the mother.

The comfort of the mother in breastfeeding was noted and evaluated.

Outcomes

- Blood loss (in the third stage of labor).
- Complications of the third stage of labor (postpartum hemorrhage, retention of placenta).
- Maternal hemoglobin and hematocrit at 24 h of delivery.

Table 2 shows comparison between hemoglobin, hematocrit, and serum ferritin levels of anemic pregnant women on admission.

In ECC group, mean Hb was 9.65±0.705 and in DCC mean Hb was 9.67±0.789 thus showing comparable Hb levels (p=0.85).

In ECC and DCC groups, mean hematocrit and serum ferritin levels were 29.178±2.03, 12.21±9.5, and 29.341±2.404, 13.89±13.88, respectively, thus showing comparability (p=0.719; p=0.479). Thus, maternal hematological parameters are comparable in both ECC and DCC groups.

Table 5 shows comparison of complications in the third stage of labor.

The mean blood loss in both the groups was 325±89.287 and 326.85±66.384, comparable statistically with p value of 0.906.

Out of 100 patients enrolled, only two patients had PPH. Each one belonged to each group (p<0.909).

None of the subjects had retained placenta showing no statistical significance between two groups (p<1).

Table 3: Comparison of complications of the third stage of labour

	ECC	DCC	p
Blood loss in 3 rd stage of labour (cc), mean±SD	325±89.287	326.85±66.384	0.906
Number of patients with PPH	1	1	0.909
Number of patients with retained placenta	0	0	1

ECC: Early cord clamping, DCC: Delayed cord clamping, SD: Standard deviation, PPH: Postpartum haemorrhage

Table 4 shows levels of hemoglobin and hematocrit after 24 h of delivery.

As such there was no significant decrease in hemoglobin levels after delivery showing non-significant effect of timing of cord clamping (p<0.716).

The hematocrit levels were also comparable in both groups mean of 28.82 and 28.64 in ECC and DCC respectively with p<0.712.

Thus DCC did not increase third stage blood loss and sono effect on hemoglobin and hematocrit levels after 24 h of delivery.

DISCUSSION

In the present study, anemic women with hemoglobin levels between 7 and 10.9 g/dL and a gestational age of 32-40 weeks were enrolled. The study population was divided into two groups: Group A, consisting of women with moderate anemia (7-9.9 g/dL), and Group B, consisting of women with mild anemia (10-10.9 g/dL).

Group A had 25 subjects in the ECC group with mean hemoglobin of 9.10±0.446 g/dL, and 31 subjects in the DCC group with a mean hemoglobin of 9.09±0.482 g/dL. Group B had 21 subjects in the ECC group with a mean hemoglobin of 10.3±0.229 g/dL, and 23 subjects in the DCC group with a mean hemoglobin of 10.4±0.285 g/dL (p=0.980).

When considering the mean hemoglobin in the total range of 7-11 g/dL, the ECC group had a mean hemoglobin of 9.65±0.7055 g/dL, and the DCC group had a mean hemoglobin of 9.67±0.789 g/dL, with a p=0.883 (0.40-1.95, p<0.854). These findings demonstrated comparable hemoglobin levels in both subgroups and groups.

In the present study, out of 100 study subjects, only two had PPH, with one case in each group, showing no effect of DCC (p<0.909).

No significant difference (p<0.906) was found in the mean blood loss during the third stage of delivery (postpartum blood loss volume, PPH) between the ECC group (325±89.287 mL) and the DCC group (326.85±66.38 mL).

A randomized controlled trial study by Ceriani Cernadas *et al.* [6] supported our study as they observed no difference in postpartum blood loss volume, PPH, and maternal hemoglobin levels after 24 h of delivery. They found no significant difference in blood loss volume and PPH rates between the ECC and DCC groups.

Table 4: Comparison of maternal Hb and hematocrit after 24 h of delivery

Mean	Maternal Hb 7-9.9 (Group A)			Maternal Hb 10-10.9 (Group B)			Total		
	ECC	DCC	p	ECC	DCC	p	ECC	DCC	p
Hb on admission	9.10±0.446	9.097±0.482	0.98	10.305±0.229	10.461±0.255	0.039	9.65±0.7055	9.678±0.789	0.854
Hb after 24 h of delivery	9.080±0.4941	9.039±0.5869	0.780	10.281±0.250	10.291±0.363	0.914	9.628±0.7238	9.572±0.800	0.716
Hematocrit on admission	27.58±1.18	27.63±1.449	0.884	31.086±0.748	31.648±1.16	0.067	29.178±2.03	29.341±2.40	0.719
Hematocrit after 24 h of delivery	27.37±1.418	27.25±1.718	0.914	30.54±0.867	30.52±2.559	0.978	28.82±1.989	28.64±2.657	0.712

Student's *t*-test. Hb: Hemoglobin, ECC: Early cord clamping, DCC: Delayed cord clamping

A study by Chaparro *et al.* [7] with 2006 mother-infant pairs from Mexico also found similar results, where they did not observe any significant variation in third-stage blood loss between the ECC and DCC groups.

Recent studies by Qian *et al.* [8], Van Rheezen *et al.* [9], and Withanathantrige *et al.* [10] also supported our findings, showing no association between third-stage complications and DCC in term and pre-term neonates, with variations in cord clamping timing, mode of delivery, and other factors.

In a recent randomized control trial by Withanathantrige *et al.* and Chantry *et al.* [11] cord clamping timing during 158 cesarean deliveries between 37 and 39 weeks of gestation was studied. They found no significant differences in post-operative hemorrhage among the three groups and no increased maternal complications of the third stage of labor in normal delivery versus cesarean deliveries with DCC (2 min) in term neonates.

The maternal hemoglobin and hematocrit levels post 24 h of delivery were comparable to the antenatal levels, showing no difference between the ECC and DCC groups. The mean hemoglobin levels antenatally/postnatally in the ECC group were 9.64/9.628, and in the DCC group were 9.66/9.572, with no statistical difference. Similar findings were observed in other studies, although mean maternal hemoglobin levels were higher in non-anemic subjects.

Maternal antenatal/postnatal mean hematocrit levels in the ECC group were 29.17/28.82, and in the DCC group were 29.26/28.64, showing no statistical significance.

Mean ferritin levels in the study subjects were higher compared to the study done by Gupta *et al.* [12], suggesting a difference in iron stores between the two studies, possibly due to differences in socioeconomic status and dietary habits.

Similarly, De Paco *et al.* conducted a study with 97 healthy pregnancies randomly placed in the ECC group (<10 s) or DCC group (2 min) and found no statistical difference in 48-h maternal hemoglobin, hematocrit parameters, and maternal blood loss between the groups [13].

The limitation of our study is that it excluded pregnancies with associated comorbidities and did not include sociodemographic variables such as socioeconomic status, motivation, lifestyle, and upbringing of babies. Further research is required to explore the benefits of DCC in diverse groups of pregnant women, including those with high-risk pregnancies, comorbidities, operative delivery, or multiple pregnancies.

Although this study provides more evidence to support that DCC can be performed in anemic pregnancies without detrimental maternal outcomes when compared to ECC, other techniques to facilitate placental transfusion that may be more efficient, practical, and timely, such as Umbilical cord clamping, should be investigated in future clinical trials.

CONCLUSION

DCC is a safe practice for both cesarean and normal deliveries, as it does not increase mean blood loss and has beneficial effects on neonates. It

is recommended for routine practice, especially in remote areas with limited resources and access to clinicopathological laboratories.

Further research is needed to explore the benefits of to facilitate placental transfusion that may be more efficient, practical, and timely, such as DCC in various groups of pregnant women, including those with high-risk pregnancies, preterm births, and multiple pregnancies.

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