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Effect of Intact Umbilical Cord Milking Vs Delayed Cord Clamping on Venous Hematocrit at 48 Hours in Term Neonates

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Conflicts of Interest: Nil

Abstract

Introduction: The appropriate time when the umbilical cord should be clamped has been an issue of debate in the medical literature for a very long time, and it has had a significant impact on clinical policies and practices all over the world. Recent work on this field has brought to light the possible advantages of delayed cord clamping (DCC), which can be characterized in a variety of ways, including clamping of the cord after one minute or until the pulsations of the cord stop. The physiological transfer of placental blood to the neonate, also known as placental transfusion, is made possible by delaying the clamping of the umbilical cord. This results in a large increase in the levels of hemoglobin and hematocrit in the infant. This procedure is useful for babies because it provides sufficient iron reserves that can last for up to six to eight months. As a result, it reduces the risk of iron deficiency anemia during critical growth phases, particularly in environments where there is limited access to foods that are rich in iron. The advantages of delaying the clamping of the cord extend beyond the status of iron, and they may have an effect on the neurodevelopmental outcomes over the long term. Iron deficiency in early children has been associated to delayed psychomotor development and reduced cognitive function later in life. This highlights the significance of interventions such as DCC in preventing these irreversible repercussions from occurring. Umbilical cord milking, also known as UCM, is a technique that efficiently raises the levels of neonatal blood components like hematocrit, hemoglobin, and red blood cell volume. This technique offers many advantages to both preterm individuals and term infants. It does this by increasing the initial blood volume and iron reserves, which in turn supports improved oxygen delivery, cardiovascular stability, and overall

development. The use of UCM is a helpful alternative to the practice of delayed cord clamping, particularly in circumstances that required prompt intervention. This study compares the hematocrit between the 2 methods umbilical cord clamping.

Objectives: To compare the venous hematocrit at 48 (+/- 6) hours in umbilical cord milking and delayed cord clamping.

Methods: This is an interventional study design conducted over a period of 19 months from June 2022 to December 2023 in our hospital AJ Institute of Medical Sciences and Research Centre, Mangalore.

Inclusion criteria: Term neonates born in AJIMS LT via normal vaginal delivery.

Exclusion criteria:

- Hydrops fetalis
- Significant congenital abnormality
- Rh isoimmunization (Rh positive neonate with a positive indirect Coombs test (ICT) result born to a Rh negative mother)
- Neonates born through meconium stained liquor
- vacuum assisted delivery or forceps
- Infants whose mothers are HIV positive, maternal eclampsia

Results: The final analysis included 158 babies. The baseline maternal and neonatal characteristics were comparable with no statistically significant difference. In comparison to the DCC, the mean hematocrit value in UCM was greater. Between the two groups, there was no statistically significant difference, nevertheless. (p = 0.1101).

Conclusion: The results of the comparison study between DCC and UCM show that polycythemia incidence was not significantly different from one another. It would suggest that, in terms of the factors that were evaluated, both strategies are equally successful in controlling the outcomes of newborns. Hence, intact umbilical cord clamping appears to be an equally effective alternative option in scenarios where DCC is feasible, such as when a baby needs to be resuscitated or when there is hemodynamic instability in the mother.

Keywords: DCC (delayed cord clamping), UCM (umbilical cord milking)

Introduction

The appropriate time when the umbilical cord should be clamped has been an issue of debate in the medical literature for a very long time, and it has had a significant impact on clinical policies and practices all over the world. In the active management of the third stage of labor, early cord clamping, which normally occurs in the first sixty seconds after birth (often in the first fifteen to thirty seconds), has traditionally been performed under the notion that it lowers the risk of postpartum hemorrhage. However, recent work on this field has brought to light the possible advantages of delayed cord clamping (DCC), which can be characterized in a variety of ways, including clamping of the cord after one minute or until the pulsations of the cord stop. The physiological transfer of placental blood to the neonate, also known as placental transfusion, is made possible by delaying the clamping of the umbilical cord. This results in a large increase in the levels of hemoglobin and hematocrit in the infant. This procedure is useful for babies because it provides sufficient iron reserves that can last for up to six to eight months. As a result, it reduces the risk of iron deficiency anemia during critical growth phases, particularly in environments where there is limited access to foods that are rich in iron. The advantages of delaying the clamping of the cord extend beyond the status of iron, and they

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may have an effect on the neurodevelopmental outcomes over the long term. Iron deficiency in early children has been associated to delayed psychomotor development and reduced cognitive function later in life. This highlights the significance of interventions such as DCC in preventing these irreversible repercussions from occurring. 1 Introduction In spite of the advantages, the general application of delayed cord clamping is fraught with difficulties, particularly in environments that are concerned with the risk of newborn hypothermia and delays in commencing resuscitation when it is required. It is now emphasized in clinical guidelines that it is important to strike a balance between these issues and the possible benefits of DCC, particularly in low-resource areas where anemia is prevalent and access to medical therapies is limited. Previous methods that promoted early clamping for the management of PPH have been challenged by recent revisions in perinatal care protocols, which argue for delayed cord clamping as part of comprehensive initiatives to prevent maternal morbidity and mortality. The timing of umbilical cord clipping also overlaps with the protocols for newborn resuscitation. In these protocols, quick access to resuscitation equipment frequently requires early clamping in order to permit timely interventions for infants who are at danger of experiencing birth asphyxia. Umbilical cord milking, also known as UCM, is a technique that efficiently raises the levels of neonatal blood components like hematocrit, hemoglobin, and red blood cell volume. This technique offers many advantages to both preterm individuals and term infants. It does this by increasing the initial blood volume and iron reserves, which in turn supports improved oxygen delivery, cardiovascular stability, and overall development. The use of UCM is a helpful alternative to the practice of delayed cord clamping, particularly in circumstances that required prompt intervention. This study compares the hematocrit between the 2 methods umbilical cord clamping: UCM and DCC.

Aims and Objectives

To compare the venous hematocrit at 48 (+/- 6) hours in umbilical cord milking and delayed cord clamping

Methods and Materials

Study design: Interventional Study

Study duration: June 2022 to December 2023.

Source of data: This is an interventiomal study. All term neonates born via normal vaginal delivery were included in the study. Institutional ethics committee permission was obtained prior to the start of the study and written informed consent was obtained from all the parents.

Sample size: 158

Inclusion criteria: All the neonates born via normal vaginal delivery in AJIMS LT during the study period.

Exclusion criteria:

- Hydrops fetalis
- Significant congenital abnormality
- Rh isoimmunization (Rh positive neonate with a positive indirect Coombs test (ICT) result born to a Rh negative mother)
- Neonates born through meconium stained liquor
- vacuum assisted delivery or forceps
- Infants whose mothers are HIV positive , maternal eclampsia

Description of the process

Intact UCM was followed in 79 neonates

DCC was followed in 79 neonates.

At 48+/-6 hours of life, Hematocrit was measured in the babies. For Hematocrit estimation, 2 ml of neonatal

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blood was collected in the EDTA purple vacutainer and sent to the lab.

Figure 1:

Symex hematology analyser was used for the analysis. T The method used for Hematocrit was RBC pulse height detecting method.

Figure 2:

Statistical analysis

Data was logged into spread sheets in Microsoft office Excel for statistical interpretation.

Data was summarized by frequency and percentages.

Categorical data was summarised by frequency and percentages.

Quantitative normal data was summarised by mean, standard deviation.

Comparison of categorical variables was performed by Chi square test and Fishers exact test.

Comparison of quantitative data was compared by t test.

SPSS 23 software was used to analyse the data.

Level of significance was 5%

P value less than 0.05 was considered to be statistically significant.

Results

The total number of patients selected for this study is 158. The patient characteristics are given below.

Maternal Age

The distribution on age shows, majority of the samples were in 20-25 years.

Table 1:

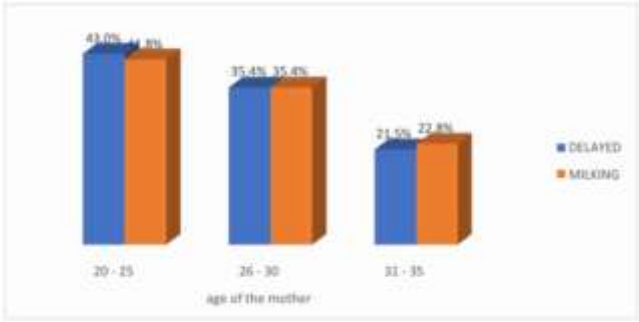
Age of the mother

		METHOD OF CORD CLAMPING			
		DELAYED		MILKING	
		Count	Column N %	Count	Column N %
Age of the mother	20 – 25	34	43.0%	33	41.8%
	26 – 30	28	35.4%	28	35.4%
	31 – 35	17	21.5%	18	22.8%

Table 2:

METHOD OF CORD CLAMPING		N	Mean	Std. Deviation	t test p value	
age of the mother	DELAYED	79	26.51	4.30	0.908	NS
	MILKING	79	26.58	3.95		

Graph 1:



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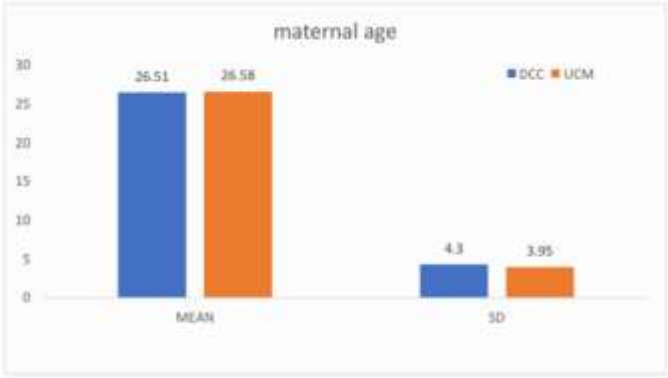

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In this study, we found that the UCM group's mean mother age was marginally greater than the DCC group's. Between the two groups, there was no statistically significant difference, nevertheless. (p = 0.908)

Parity

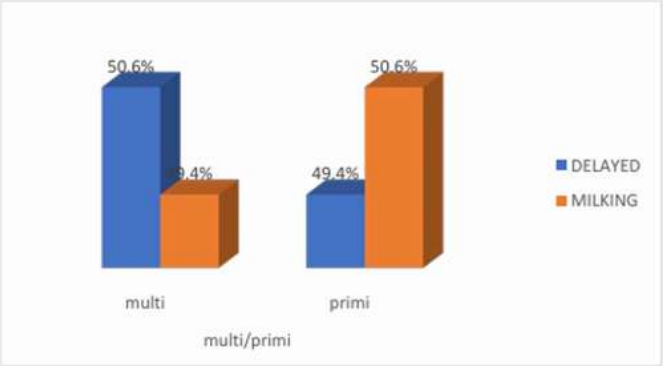
Table 3:

		METHOD OF CORD CLAMPING			
		DELAYED		MILKING	
		Count	Column N %	Count	Column N %
multi/primi	Multi	40	50.6%	39	49.4%
	Primi	39	49.4%	40	50.6%

Table 4:

METHOD OF CORD CLAMPING with Following parameters	chi square(C)/Fishers exact test(F)	p value	
multi/primi	C	0.874	NS

Graph 3:



In the DCC group, 50.6% and in the UCM group, 49.4% were multigravida. There was no statistical difference between the 2 groups.

Birth weight of the baby

Table 5:

		METHOD OF CORD CLAMPING			
		DELAYED		MILKING	
		Count	Column N %	Count	Column N %
weight of baby	2.6 - 3.0	46	58.2%	49	62.0%
	3.1 - 4.0	33	41.8%	30	38.0%

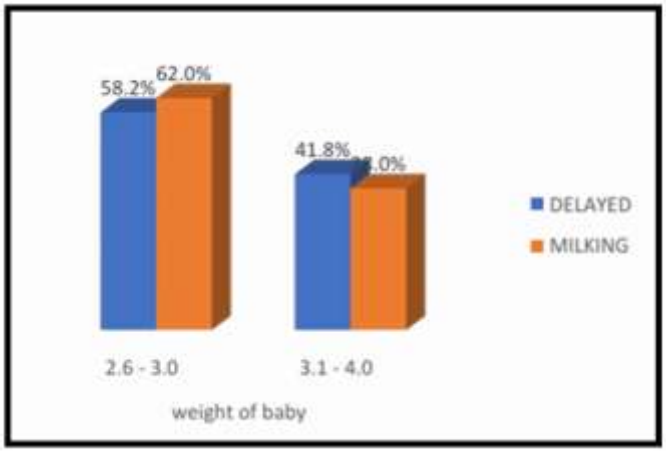
Table 6:

METHOD OF CORD CLAMPING with Following parameters	chi square(C)/Fishers exact test(F)	p value	
weight of baby	C	0.626	NS

Table 7:

METHOD OF CORD CLAMPING		N	Mean	Std. Deviation	t test p value	
weight of baby	DELAYED	79	2.99	0.25	0.802	NS
	MILKING	79	3.00	0.25		

Graph 4:



Every baby weighed in the range of 2.5 to 3.5 kg. The newborns that had UCM had a greater mean weight than the babies who had DCC. The two groups did not differ statistically from one another. (p =.802)

Gender distribution

Table 8:

		METHOD OF CORD CLAMPING			
		DELAYED		MILKING	
		Count	Column N %	Count	Column N %
sex of baby	F	32	40.5%	30	38.0%
	M	47	59.5%	49	62.0%

Table 9:

METHOD OF CORD CLAMPING with Following parameters	chi square(C)/Fishers exact test(F)	p value	
sex of baby	C	0.745	NS

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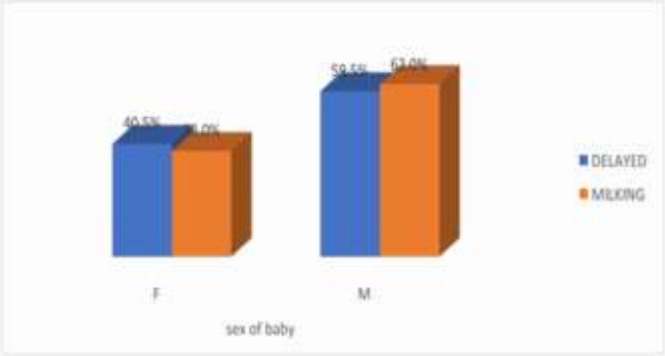
Graph 5:



In this study, males were higher than the females in both the groups. However, the difference was not statistically significant. (p=0.745)

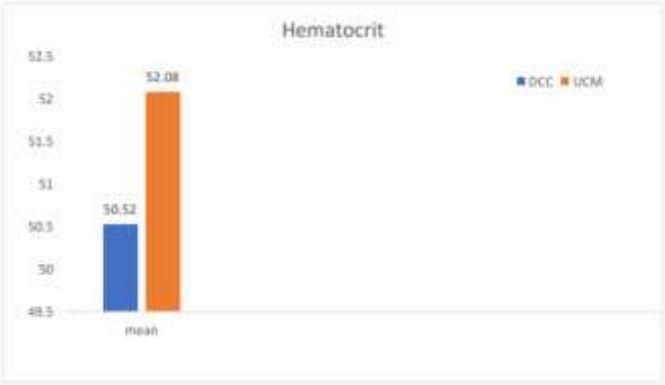
Outcome

Table 10:

Hematocrit between the 2 groups at 48+/- 6 hours of life

METHOD OF CORD CLAMPING		N	Mean	Std. Deviation	t test p value	
HEMATOCRIT	DELAYED	79	50.52	5.83	0.101	NS
	MILKING	79	52.08	6.07		

Graph 6:



The mean hematocrit value in UCM was higher compared to the DCC. However, there was no statistical significance between the 2 groups. (p=0.101)

Discussion

The overall outcome of a neonate is influenced by the method used for cord clamping. The neonatal outcome will be enhanced by DCC and UCM. The purpose of this study was to evaluate the impact of DCC and UCM, two techniques for umbilical cord clamping, on newborns' venous hematocrit.. The term neonates born via NVD in AJ IMS LT between June 2022 and December 2023 were the subjects of this hospital-based study. For the study, convenience sampling was used. Two cord clamping techniques were used. Measuring the hematocrit in the two groups was the main goal. The two groups' polycythemia incidences were contrasted.

In comparison to the DCC, the mean hematocrit value in UCM was greater. Between the two groups, there was no statistically significant difference, nevertheless. (p = 0.1101).

Limitations

- There was no long term follow up for the outcome.
- Small sample size as compared to the population at large

Conclusion

The results of the comparison study between DCC and UCM show that the hematocrit values between the two groups was not significantly different from one another. It would suggest that, in terms of the factors that were evaluated, both strategies are equally successful in controlling the outcomes of newborns. Hence, intact umbilical cord clamping appears to be an equally effective alternative option in scenarios where DCC is feasible, such as when a baby needs to be resuscitated or when there is hemodynamic instability in the mother. It's possible that further studies with bigger sample numbers and more factors will shed more light on the subtle differences between these two cord management approaches.

In conclusion, the shift towards delayed clamping and umbilical cord milking is a good step towards better neonatal care, as it has the potential to improve both the short- and long-term outcomes for newborns. This is

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especially true in resource limited settings where preventive measures against iron deficiency anemia and its associated developmental impacts are critical. However, the timing of umbilical cord clamping will continue to be tailored based on evolving research and clinical context.

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