

Frequency and Related Clinical Features of Polycythemia in Full Term Newborns in Whom Cord Clamping was Delayed

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ABSTRACT

Aim: To determine the frequency and related clinical features of polycythemia in full term newborns in whom cord clamping was delayed at tertiary care hospital.

Setting: Pediatric Medicine and Gynecology Department of Lahore General Hospital from January 2012 to June 2012.

Methods: Full term newborns meeting the inclusion criteria were admitted through emergency. Exclusion criteria were strictly followed to control confounding variables. The purpose, procedure, risks and benefits were explained to parents of children and informed consent was taken. Selected full term newborns (cord clamping done at 3 minutes) as mentioned in operational definition was kept under observation for relevant clinical features like jitteriness, hypoglycemia, plethora and cyanosis during hospital stay till polycythemia was diagnosed and polycythemic newborns were managed according to protocol of our unit to avoid any complications. We drew blood samples and sent it to laboratory for hematocrit level at 24 hours after birth to assess polycythemia as mentioned in operational definition.

Results: Total 250 neonates were included in this study, 138(55.2%) were male and 112(44.8%) were females, frequency of polycythemia in neonates with delayed cord clamping was recorded in 21(8.4%) while 229(91.6%) had no polycythemia, out of polycythemic newborns, 6(28.57%) with Jitteriness, 10(47.62%) with plethora, 13(61.90%) had hypoglycemia, 2(9.52%) had cyanosis.

Conclusion: The results of the study reveal that frequency of polycythemia and related clinical features of the morbidity in full term newborns in whom cord clamping was delayed at tertiary care hospital are higher.

Keywords: Polycythemia, full term newborns, delayed cord clamping, clinical features

INTRODUCTION

Polycythemia is defined as venous hematocrit more than 65% or a venous hemoglobin concentration in excess of 22gm/dl. The incidence of polycythemia is 1.5-4% of all live births. It is uncommon in preterm infants. Neonates born at higher altitudes also have a higher incidence of polycythemia¹.

Significant changes take place in the hematocrit of newborn in the first 24 hours of life. The hematocrit peaks at first 2 hours of age and values upto 71% may be taken normal at this age. It gradually declines to 68% by 6 hrs and usually stabilizes by 12 to 24 hours².

Polycythemia is not a benign condition, hematocrit above 65% can cause impairment of tissue oxygenation and perfusion, hence damages vital organs like adrenal glands, kidneys and cerebral cortex. So early diagnosis and prompt treatment is life saving⁹.

Maternal factors like diabetes, hypertension, cyanotic heart disease, smoking increase the risk of polycythemia. Polycythemia is also seen in newborns

of perinatal asphyxia, twin pregnancy, IUGR, delayed, delayed cord clamping, trisomy 13, 18, 21, CAH and thyrotoxicosis. The most common presentation of polycythemia is plethora, feeding problems and hypoglycemia. Other manifestations like hypotonia, sleepiness, irritability, jitteriness, tachycardia and cyanosis may be seen in some babies¹.

Screening is recommended for babies who are SGA (small for gestational age), IDM (infant of diabetic mother), monochorionic twins and LGA because of relatively increased risk of polycythemia in these babies. A normal value at 2 hours of age (hematocrit <65%) does not merit any further screening unless the infant becomes symptomatic^{1,2}.

Literature analysis shows that incidence of polycythemia is significantly high among full term newborns with delayed cord clamping, small for gestational age (15%) and infants of diabetic mother. About 50% newborns remain asymptomatic and other show non specific symptoms like jitteriness, plethora, hypoglycemia and reluctant to feed^{1,2}.

We planned this study to determine the frequency of polycythemia in our population because no data is available at present. Literature analysis shows its incidence is significantly high in delayed

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cord clamped newborns which prevents for anemia and rises iron stores⁸; In our setup it is beneficial for newborns but it also causes sudden rise in hematocrit level which is harmful^{9,10}. By doing this study, we will know frequency of polycythemia even in asymptomatic newborns in whom cord clamping was delayed. It will throw light as if delayed clamping should be done or not and will determine various presentations of polycythemia. The study will aware pediatrician/gynaecologists about most common clinical presentation of polycythemia which will further enable us to intervene earlier to save babies from detrimental effects of hyperviscosity^{7,9}.

MATERIAL & METHODS

A total of 250 full term newborns (only hospital born), of both sexes with delayed cord clamping were included in the study while RH/ABO incompatibility (mother and baby blood groups), Infant of diabetic mother (history of maternal diabetes), antepartum hemorrhage, Risk factor of sepsis like maternal fever (more than 102F), premature rupture of membranes >18 hours, twin Pregnancies (antenatal USG) Intrauterine growth retarded babies (weight<2.5Kg) and Pre-eclampsia (maternal H/O hypertension) were excluded from the study. All cases were admitted through emergency. The purpose, procedure, risks and benefits were explained to parents of children and informed consent was taken. Selected full term newborns (cord clamping done at 3 minutes) as mentioned in operational definition was kept under observation for relevant clinical features like jitteriness, hypoglycemia, plethora and cyanosis during hospital stay till polycythemia was diagnosed and polycythemic newborns were managed according to protocol of our unit to avoid any complications. We drew blood samples and sent it to laboratory for hematocrit level at 24 hours after birth to assess polycythemia as mentioned in operational definition. All this information was collected through proforma attached.

The Data was analyzed with the help of SPSS software version 10.0. Quantitative variables like age of newborn babies in days, were presented in the form of Mean±S.D. Qualitative variables like gender, polycythemia and clinical features i.e. Jitteriness, Plethora, Hypoglycemia, cyanosis, feeding problem were presented in the form of frequency and percentages.

RESULTS

In this study, a total of 250 patients were recruited after fulfilling the inclusion/exclusion criteria to determine the frequency and related clinical features

of polycythemia in full term newborns in whom cord clamping was delayed at tertiary care hospital. Age distribution of the patients was done, where 96(38.4%) were between 1-2 hours, 83(33.2%) were between 3-4 hours and 71(28.4%) were with >4 hours, mean and sd was calculated as 2.45±0.67 hours. (Table 1)

Table 1: Age distribution

| Age (in hours) | n | %age |
|----------------|-----------|------|
| 1-2 | 96 | 38.4 |
| 3-4 | 83 | 33.2 |
| >4 | 71 | 28.4 |
| Mean and SD | 2.45±0.67 | |

Table 2: Gender distribution of the subjects (n=250)

| Gender | n | %age |
|--------|-----|------|
| Male | 138 | 55.2 |
| Female | 112 | 44.8 |

Table 3: Frequency of polycythemia in neonates with delayed cord clamping (n=250)

| Polycythemia | n | %age |
|--------------|-----|------|
| Yes | 21 | 8.4 |
| No | 229 | 91.6 |

Table 4: Frequency of clinical features of polycythemia in neonates with delayed cord clamping (n=250)

| Clinical features | n | %age |
|-------------------|----|-------|
| Jitteriness | 6 | 28.57 |
| Plethora | 10 | 47.62 |
| Hypoglycemia | 13 | 61.90 |
| Cyanosis | 2 | 9.52 |
| Feeding problem | 10 | 47.62 |

Distribution of gender of the patient shows 138(55.2%) were male and 112(44.8%) were females (Table 2). Frequency of polycythemia in neonates with delayed cord clamping was recorded in 21(8.4%) while 229(91.6%) had no polycythemia (Table 3). Clinical features of polycythemia in neonates with delayed cord clamping reveals 6(28.57%) with Jitteriness, 10(47.62%) with plethora, 13(61.90%) had hypoglycemia, 2(9.52%) had cyanosis while 10(47.62%) had feed problems (Table 4).

DISCUSSION

Immediate clamping of the umbilical cord can reduce the red blood cells an infant receives at birth by more than 50%, resulting in potential short-term and long-term neonatal problems.

Saigal and Usher¹¹ initially raised the concern about the potential for polycythemia with delayed cord clamping in 1977. They coined the phrase "symptomatic neonatal plethora" to describe a subgroup of babies with various times of cord clamping who either had hypervolemia or elevated

hematocrit develop and were symptomatic. Polycythemia is defined as a venous hematocrit level greater than 65% to 70%¹²⁻¹³ and has been associated with neurologic sequelae¹⁴. Although clinical manifestations of polycythemia are nonspecific¹⁵ Saigal reported such generalized symptoms as plethoric skin color, tachypnea, retractions, rales, cyanosis, grunting, hypotension, and hypoglycemia in addition to such neurologic symptoms as apneic spells, depression, and irritability. However, a 1992 randomized clinical trial found no differences in neurologic outcomes at 30 months when polycythemic infants and control infants returned for follow-up evaluation¹⁶.

We planned this study as in our population no data is available at present. Literature analysis shows its incidence is significantly higher in delayed cord clamped newborns which prevents for anemia and rises iron stores⁸. In our setup it is beneficial for newborns but it also causes sudden rise in hematocrit level which is harmful^{9,10}.

We recorded 138(55.2%) male and 112(44.8%) females, frequency of polycythemia in neonates with delayed cord clamping was 2(8.4%) and clinical features of polycythemia in neonates with delayed cord clamping revealed 6(28.57%) with Jitteriness, 10(47.62%) with plethora, 13(61.90%) had hypoglycemia, 2(9.52%) had cyanosis while 10(47.62%) had feed problems.

The data from the randomized clinical trials and the "controlled trials" over the last two decades do not support the theory that delayed cord clamping causes symptomatic polycythemia, despite the fact that hematocrit levels are higher in late-clamped term and preterm infants. Symptomatic polycythemia was not found in the 531 late-clamped term infants in the studies or in any of the preterm infants. Only two infants, both asymptomatic, had hematocrit levels above 65% and both had been lowered while clamping was delayed for 3 minutes¹⁷.

Other studies completed before 1980 reported no symptomatic polycythemia even when infants were held at the level of the perineum or lowered and cord clamping was delayed until pulsations ceased. One case report was found that attributed polycythemia to a water birth with delayed clamping¹⁸. Because delayed cord clamping occurs routinely at water births, this singular report requires more investigation. Currently, the American Academy of Pediatrics does not recommend routine examination of newborn's hematocrit levels to check for polycythemia.

Our results regarding incidence of polycythemia are in agreement with the study conducted by Krishnan L and colleagues⁹ who recorded 5.8% polycythemia and clinical features were also in

agreement with their findings as they recorded Feeding problems (51%), plethora (40.4%) and hypoglycemia (53%), cyanosis (8.5%) and the Jitteriness in (25.5%) of the neonates which are closely related with the results of our study⁹.

However, considering the frequency of above clinical features in asymptomatic newborns in whom cord clamping was delayed, polycythemia may be determined earlier and can be managed accordingly. Furthermore, the results of the study may aware pediatrician/gynaecologists about most common clinical presentation of polycythemia which further enable us to intervene earlier to save babies from detrimental effects of hyperviscosity^{7,9}.

CONCLUSION

The results of the study reveal that frequency of polycythemia and related clinical features of the morbidity in full term newborns in which cord clamping was delayed at tertiary care hospital are higher.

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