

Comparison of early versus delayed cord clamping in neonates born at term in a tertiary care hospital

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Abstract

Introduction: Prevention of iron deficiency in infancy may promote neurological development. Delayed cord clamping can prevent iron deficiency during the first 6 months of life. Very limited data is available on impact of timing of cord clamping on infant development in the early years of life.

Objective: To compare the mean IgG levels and Ages and stages questionnaires (ASQ) score of early versus delayed cord clamping in neonates born at term in a tertiary care hospital

Material and Methods: A randomized clinical trial was done at the Department of Pediatric Medicine, Services Hospital, and Lahore during period from 1st June 2019 till 30th June 2020. A total of 220 patients fulfilling the inclusion criteria were included in the study in group A, cord was clamped early and in group B, cord was clamped delayed. Then all patients had undergone delivery. After 4 months, blood sample of neonate was obtained for assessment of IgG level. ASQ score was assessed by researcher herself and noted.

Results: IgG level and ASQ score was compared at 4th month in term neonates who underwent early and delayed cord clamping. Results of this study showed that IgG level and ASQ score did not show statistically significant difference in neonates in both study groups. i.e. IgG level: Group-A: 3.13 vs. Group-B: 3.27, p-value=0.303 & ASQ score: Group-A: 255.15 vs. Group-B: 258.57, p-value>0.05.

Conclusion: There was insignificant difference in IgG level and ASQ score in term neonates up to 4 months of age who underwent early and delayed cord clamping.

Keywords: Early cord clamping, Delayed cord clamping, Neonates, IgG levels, ASQ score

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Introduction

The timing of cord clamping and cutting is frequently regarded as one of the components of active management of the third stage of labour (other components are administration of a prophylactic uterotonic at or after delivery of the baby, controlled cord traction and uterine massage). However, there is no consensus on the precise meaning of the word “early” in this context.¹

The practice of early cord clamping started in the 20th century with increasing number of women opting for hospital births, and increasing number of obstetricians conducting such deliveries. This practice probably evolved with

intent to carry-out resuscitation of pre-term and depressed term infant as soon after birth as possible. This can help in reducing the incidence of polycythaemia and jaundice.²

It is the usual practice to clamp umbilical cord immediately after birth. There is no sound evidence to support this approach, which might deprive the newborn of some benefits, such as an increase in iron storage.³ Policies for timing of cord clamping vary, with early cord clamping generally carried out in the first 60 seconds after birth, whereas later cord clamping usually involves clamping the umbilical cord more than one minute after the birth or when cord pulsation has ceased. The benefits and potential

harms of each policy are debated.¹

Delayed cord clamping at birth has shown to benefit neonates with increased placental transfusion leading to higher hemoglobin concentrations, additional iron stores and less anemia later in infancy, higher red blood cell flow to vital organs and better cardiopulmonary adaptation.⁴

Delayed umbilical cord clamping has been suggested as a measure to prevent infant iron deficiency, but data concerning its health benefits and possible adverse effects, especially in high income countries is scarce.⁵ Thus, delayed umbilical cord clamping (not earlier than 1 min after birth) is recommended for improved maternal and infant health and nutrition outcomes.⁶

In a randomized trial, it was noted that mean IgG was 11.7 ± 1.9 g/l in delayed group and 11.0 ± 1.8 g/l in early group ($p=0.004$). The mean ASQ score at 4 months of age was 258.9 ± 28.4 in delayed group and 257.5 ± 29.2 in early group ($p=0.6$).⁷

Rationale of study is to compare the outcome of early versus delayed cord clamping in neonates born at term in a tertiary care hospital. Literature has reported that the outcome of delayed cord clamping is better than early cord clamping. With delayed cord clamping, enough blood and important blood nutrients flow from placenta to neonate which help him in building-up of body and help in reducing the incidence of iron deficiency anaemia in children in later ages. Many studies has reported about short term outcome of this comparison in terms of haemoglobin or hematocrit levels. But not much work has been done on long term outcome of this comparison in terms of neuro-development and immunity of neonate. Moreover, there was no local study we observed in literature which can help us to get the magnitude of problem in local population. So through this study we want to get the local evidence which could help us in implementing the results of this study. This will help in the improvement of our practice as well as will also help us to update guidelines for better management protocols for neonates.

Material and Methods:

A randomized clinical trial was done at the Department of Pediatric Medicine, Services Hospital, Lahore during period from 1st June 2019 till 30th June 2020. Sample size of 220 cases; 110 cases in each group is calculated with 95% confidence level, 80% power of test and taking magnitude of mean IgG i.e. 11.7 ± 1.9 g/L in delayed cord clamping and 11.0 ± 1.8 g/L in early cord clamping.⁷ Non probability, consecutive sampling technique was used to collect the information from cases. Neonates of either gender born at term (>37 weeks of gestation assessed through antenatal record of mother) delivering in Department of Obstetrics & Gynecology cases were included in the study while cases with low birth weight (<2000 grams), maternal diseases, neonates with sepsis, asphyxia, prematurity comorbid condition and neonate with congenital anomaly (on medical record and clinical examination) were excluded from the study.

Total 220 patients fulfilling the inclusion criteria were included in the study from labour room and operation theatre of Department of Obstetrics & Gynecology, Services Hospital, Lahore. An informed consent was taken from parents to include their baby in study. Demographic detailed (name, gestational age, gender) was noted. Then patients were randomly divided in two groups A and B by simple lottery methods. In group A, cord was clamped early and in group B, cord was clamped delayed. Then all patients undergone delivery. After delivery patients were shifted in post-delivery ward and after 4 months, blood sample of neonate was obtained in a 3cc syringe under aseptic measures. All samples were stored and sent to the laboratory of the hospital for assessment of IgG level. Reports were assessed and level was noted (as per operational definition). All females were advised to present after 4 months of delivery for neural assessment of their neonate. ASQ score was assessed by researcher herself and noted. Data was collected on a standardized proforma. Data was entered and analyzed using SPSS version 20. Quantitative variables like gestational age at birth, birth weight, ASQ score and IgG level

Table 1: Demographic profile of patients

Variables	Group-A Clamped Early	Group-B Clamped Late
Age of neonates	38.55±0.58 (Range=38-40)	38.52±0.55 (Range=38-40)
Weight of neonates	3334.96±487.43 (Range=2526-4180)	3309.09±481.57 (Range=2504-4187)
IgG level	3.13±0.78 (Range=2-4)	3.27±1.14 (Range=2-5)
ASQ score	255.15±18.49 (Range=225-280)	258.57±11.57 (Range=240-280)

Table 2: Stratification of IgG level and ASQ scores in both study group based on demographic variables

Variables	Categories	Group-A Clamped Early	Group-B Clamped Late	p-value
IgG Level				
Gestational Age	≤38 Weeks	3.29±0.76	3.36±1.07	0.780
	>38 Weeks	2.98±0.77	3.18±1.20	0.302
Gender	Male	3.12±0.80	3.18±1.17	0.744
	Female	3.15±0.76	3.38±1.10	0.228
Weight	< 2500	3.50±0.75	3.33±0.57	0.740
	>2500	3.10±0.78	3.27±1.15	0.231
ASQ Scores				
Gestational Age	≤38 Weeks	256.25±19.48	258.30±12.31	0.514
	>38 Weeks	254.08±17.58	258.83±10.89	0.090
Gender	Male	256.68±18.33	259.38±11.98	0.351
	Female	253.50±18.69	257.60±11.10	0.178
Weight	< 2500	261.37±23.37	259.66±17.09	0.912
	>2500	254.66±18.10	258.54±11.49	0.068

(> 38 weeks/ < 38 weeks), gender and birth weight (>2500 g/<2500 g). Post-stratification, independent sample t-test was applied to hypothesize the difference in mean IgG levels and ASQ score in neonates born at term with p-value≤0.05 as significant.

Results:

In this study, a total of 220 participants involved among these more than half of the cases, the gender was males neonates (53.18%) while 46.82% were female neonates. The mean gestational age of neonates at time of birth was 38.55±0.58 weeks in group-A and 38.52±0.55 weeks in group-B. In group-A 57(51.82%) neonates were male and 53(48.18%) were females. While in group-B 60(54.55%) neonates were male and 50(45.46%) were females. Mean birth weight of neonates in group-A was 3334.96±487.43grams and in group-B was 3309.09±481.57 grams. Mean IgG level in Group-A was 3.13±0.78 and in group-B was 3.27±1.14. Mean ASQ score in group-A was 255.15±18.49 and in group-B was 258.57±11.57. (Table-1, Figure 1)

Data was stratified for gestational age of neonate, gender, weight at birth to control mean IgG level and ASQ scores and insignificant difference in mean IgG level and ASQ scores in both groups on stratification obtained as stratified for p>0.05. (Table 2)

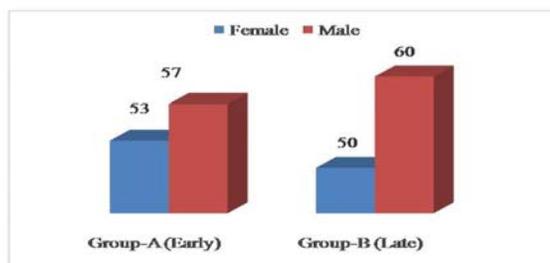


Figure 1: Gender distribution patients according to study group

at 4 months was presented by Mean and SD. Qualitative variables like gender was presented by frequency and percentage. Both groups were compared by using independent sample t-test. P-value ≤ 0.05 was considered as significant. Data was stratified for gestational age at birth

Discussion:

In this study IgG level and ASQ score was compared at 4th month in term neonates who underwent early and delayed cord clamping. Results of this study showed that IgG level and ASQ score did not show statistically significant difference in neonates in both study groups. I.e. IgG level: Group-A: 3.13 vs. Group-B: 3.27, p-value=0.303& ASQ score: Group-A: 255.15 vs. Group-B: 258.57, p-value=0.102. Stratification of gestational age, gender and weight of neonates also did not show any significant difference for IgG level and ASQ score in relation to early and delayed cord clamping.

Similar findings were reported by Ola Andersson in his study in which he showed that IgG

level and ASQ score did not differ between study groups at 4th month.⁷ However in the same study a significant difference was seen in IgG level at 2-3 days.

Neuro-development in relation to time of cord clamping has previously only been reported twice in the literature. Mercer et al demonstrated in boys born very preterm that delayed cord clamping had a protective effect against motor disability at age 7 months.⁸

Previous studies performed by the principal investigator in a high-income country have shown that delayed cord clamping, compared with early clamping, resulted in a reduced prevalence of neonatal anaemia.⁵ Further-more, delayed cord clamping improved iron status and reduced the prevalence of iron deficiency (ID) in infants at four months of age without demonstrable adverse effects.^{5,9} As iron deficiency in infants even without anaemia has been associated with impaired development,^{10,11} delayed cord clamping seems to benefit full term infants even in regions with a relatively low prevalence of iron deficiency anaemia.⁵

However, delayed cord clamping was associated with improved fine motor function at 4 years of age.¹² Although ID anaemia is rare (3–9 %) in high-income countries,¹³ the negative impact on children's health and development should not be under-estimated.

Even though previous data indicate that delayed cord clamping and improved infant iron status could have long-term effects on infant health, there is a lack of studies investigating these associations. Also delayed cord clamping seems to be protective of motor disability in male very low birth weight infants, possibly as a result of increased blood, red cell and stem cell volume.⁸

A search on immunoglobulin and cord clamping on Medline rendered only one study on term infants, which demonstrated no effect on neonatal IgG levels from delivery to cord clamping time. No previous attempts to assess early neuro-development in relation to umbilical cord clamp-

ing have been made in full-term infants.

Long-term effects of delayed umbilical cord clamping have been evaluated in a limited number of studies. In a single cohort, assessed from 4 months to 4 years of age, 5, 12, 78 scores of neuro-development did not differ by timing of umbilical cord clamping among patients at 4 months and 12 months of age. At 4 years of age, children in the early umbilical cord clamping group had modestly lower scores in social and fine motor domains compared with the delayed umbilical cord clamping group.¹²

Term and pre-term infants appear to derive benefit from delayed umbilical cord clamping; therefore, delayed umbilical cord clamping for at least 30–60 seconds is recommended in term and pre-term infants except when immediate umbilical cord clamping is necessary because of neonatal or maternal indications. In term infants, delayed umbilical cord clamping increases hemoglobin levels at birth and improves iron stores in the first several months of life, which may have a favorable effect on developmental outcomes. There is a small increase in jaundice requiring phototherapy in term infants undergoing delayed umbilical cord clamping. Consequently, obstetrician, gynecologists and other obstetric care providers adopting delayed cord clamping in term infants should ensure that mechanisms are in place to monitor for and treat neonatal jaundice.^{13,14}

Conclusion:

Results of this study did not show any significant difference in IgG level and ASQ score in term neonates up to 4 months of age who underwent early and delayed cord clamping. Although very few studies have addressed this issue more studies are required to generate the evidence that may show any possible impact of timing of cord clamping on infant development in the early years of life.

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Role and contribution of authors:

Madiha Iqbal, is the initiator of this study and wrote the study protocol and a large part of this manuscript

Shazia Rizwan, involved as supervisor for the protocol and progress of the study, reviewed the intellectual concept of the study, and helped in literature research

Anum, is responsible for formal critical analysis, statistical analysis and validation and literature reserach

Muhammad Shahid Ghaffar, collected the references and helped in discussion writing.

Hina Mehmood, helped in writing manuscript, data collection and data duration

Maria Imdad, is involved as research coordinator and writing draft

Sana Imdad was responsible for sending investigations, followup and data collection

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