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THE IMPACT ACT OF DELAYED CORD CLAMPING IN THE NEW BORN

Paediatrics

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KEYWORDS

cesarean section, increasing trends, social reasons, zero error syndrome.

INTRODUCTION:

Anemia long has been recognized as a major public health problem affecting about 10% of the population in developed countries and 25-50% in developing countries [(1)]. The most common type of anemia encountered is iron deficiency anemia and its distribution is worldwide. It is estimated that 30% of the global population suffers from IDA; most of those affected live in developing countries[(2,3)] Due to exclusive inclusion of milk in the first year of life, the amount of iron required is not met by dietary sources. The current study has been undertaken as a randomized, controlled clinical trial, to study the impact of delayed cord clamping in the newborn and infant in relation to both short come and long term outcomes.

AIMS AND OBJECTIVES:

The study was conducted with the following objectives:

- To compare cord clamping at 1 minute and 3 minutes in respect to the newborn Hemoglobin, iron and ferritin.
- To assess the effect of delayed cord clamping at 3minutes in respect to newborn hematocrit and bilirubin levels and retirement for photochemical therapy.
- To compare the effects of cord clamping at 1 and 3 minutes on infant iron and detritus status at 3 months of age.

METHODS AND MATERIALS:

Trial design:

Randomized controlled trial (parallel-group study with 1:1 randomization) comparing delayed cord clamping (DCC) with early cord clamping (ECC). The study was conducted in between January 2016 to August 2016 in Mahavir Institute Of Medical Sciences.

Participants

Pregnant women were eligible if they met the following criteria:
Non - smoking;
Healthy (no hemolytic disease, no treatment with any of the following drugs: anticonvulsants, antidepressants, thyroid hormone, insulin, chemotherapy or cortisone);
Normal pregnancy (no pre-eclampsia, no diabetes, no prolonged rupture of membranes or signs of infection);

Singleton;
Term pregnancy (gestational age 37+0 until 41+6 weeks +days);
Neonatal exclusion criteria were-
Serious congenital malformations,
Syndromes or other congenital diseases that could affect outcomes.

Neonates born in Mahavir Institute Of medical sciences by nvd / Iscs of full term gestation without any perinatal complications from the month of feb 2016 to may 2016 were included in the study.

All newborns with postnatal complications / anomalies / morbidities / sepsis have been removed from the study.
Newborns give phototherapy were not excluded out of the study in order to assess the incidence of hyperbilirubinemia in both groups.

OBSERVATION AND RESULTS:

Maternal characteristics:

- There were no significant difference in maternal characteristics between the Delayed Cord Clamping and Early Cord Clamping groups.
- All women had come for regular antenatal check ups, ultrasound scans and had taken prenatal supplements.
- The differences between the two groups in maternal age, parity, hb, hematocrit, prev complication, iron and ferritin was not observed.

Newborn characteristics:

Randomization was successful as groups were comparable in most aspects. There was no significant difference in the gestational age, birth weight, male gender, and anthropometry.

- There was no significant difference in the gestational age, birth weight, male gender, and anthropometry.
- Only newborns with an APGAR score of > 6 in 1 min taken as a part of the study. All LBW (<2.5 kgs) newborns were excluded out of the study.
- The newborns with complications during delivery, and postnatal complications were excluded from the study.

BILIRUBIN AND JAUNDICE:

- Bilirubin data, measured in cord blood and at 2 days.
- Hyper-bilirubinaemia of >10 mg/dl was seen in 10 babies in group 2 and in 6 in group 1, (p=0.37).
- 17 infants needed treatment with photography, in group 2 and 15 in group 1. (p=0.25)

HAEMATOLOGICAL AND IRON STATUS:

Neonatal, up 2 to 3 days

Blood sampling was, performed at a median (range) postnatal age of 2.4 (2.0 to 4.9) days in the DCC group and 2.4 (1.9 to 4.2) days in the ECC group, (p=0.9).

Umbilical cord Hb was higher by 8% [18.04 g/l (15.8 to 19.9)] (p<0.001) and Hct were higher by 7.8% [(47.9-58.8)], (p<0.001) in group 2.

At 2 days, Hb was higher in group 2 BY 9.6% (p<0.001), as well as Hct higher by 9.3% (p<0.001), while no cases of polycythemia were recorded at this time.

3 months

The primary endpoint of this randomized controlled study was iron and ferritin status at 3 months; with sample size calculated using ferritin levels. Blood samples were taken at a median (range) of 91 days (75 to 106) in the DCC group (n=61), and 88 days (73 to 104) in the ECC group (n=63).

Ferritin was 20.01% higher in the DCC group, (94.12 g/l versus 58.53 g/l) in the ECC group, (p<0.001). All indicators of iron status demonstrated significantly higher iron stores in the DCC group. The

results remained statistically significant also when analyzing per protocol. Iron was 12.8% higher in the DCC group (85.9 versus 76.1) (p<0.001)

Hb was 8.8% higher in the DCC group, (10.35 mg/dl) (p<0.001) and Hct was 10.1% higher in the DCC group (31.4 versus 28.5) (p<0.001)

DISCUSSION:

It has generally been observed that healthy breatfed infants are unlikely to become iron deficient before 6 months of age[7] . This is possibly because of the high bioavailability of iron from breast milk and not much increase in utilization of body iron during this period[8] . Between 4-12 months of age, body iron is expected to increase by 70%, thus making this a period vulnerable to iron deficiency anemia. The recent NFHS survey has reported very high prevalence of anemia both in mother and their children in India, with almost a quarter of children of severely anemic mothers being also severely anemic.

Iron stores at birth correlate with iron stores at 6-12 months. Studies have observed that infants of mothers with moderate and severe anemia had significantly lower cord serum ferritin levels and hence lower iron stores at birth[9,10]. It has also been observed that even in iron replete Indian mothers (serum ferritin >10 ug/l), the cord ferritin was significantly lower compared to western reports[10].

This is in contrast to study done by Hutton EK et al, Backes CH et al, McDonald SJ et al which states that Concern has been raised that DCC will prevent timely resuscitation, particularly in premature newborns who appear cyanotic and/or apneic. Whether apneic premature newborns would benefit from active resuscitation with positive pressure ventilation during DCC needs to be further studied.

Although multiple RCTs have demonstrated the safety and potential benefits of DCC, reluctance to adopt this practice persists. Uncertainly about long-term outcomes requires additional adequately powered RCTs to establish long-term risks and benefits[11,12]

This study was set out to make a board approach to the subject, and tried to evaluate an array of proposed effects of delayed versus early cord clamping, both those considered beneficial and those considered disadvantageous.

Through the normal turnover of red blood cells, hemoglobin is metabolized and transferred to iron stores. Increased hemoglobin would then result in increased iron stores, and could thus prevent iron deficiency, and as a consequence also protect infants from iron deficiency anemia and iron deficiency-associated neurodevelopmental and behavioral deficits.

Similar to our study these have been extensively documented by others.[14,4] However, in contrast when Hb and hematocrit were repeated at 4 months Andersson et al. [6] Found no difference between both groups. Also two studies from India however do not demonstrate the benefit of DCC for preventing anemia[5,13] in term babies.

Needless to say, the study like any other study had limitations. The study was conducted at a single center. To come out with a consensus, multicentric study needs to be done with large sample size. In this study, both the exclusively breastfed infants and those supplemented with other milk types along with the breast milk were included. The iron absorbed from the breast milk is more than that of other milk types. In this study, only full term healthy neonates were included; however, to generalize the findings of the present study, all types of neonates should be included.

In this study, the main perspective has been on long term (up to 3 months) effects of DCC versus ECC on term healthy infants, with focus on hemoglobin, hematocrit, ferritin, and iron stores.

Our results showed that delaying clamping of the umbilical cord for at least 2 minutes after birth consistently improved both the short- and long-term hematologic and iron status of full-term infants by improving iron stores at 3 months of age, thereby lending partly support for the 'placental transfusion model', while none of the suggested disadvantages of DCC has been demonstrated to have occurred in the study.

The Pan American Health Organization released new recommend ations favoring delayed cord clamping over immediate cord clamping. This intervention has not only been proven effective, but it is cost-free, making it a particularly appropriate and sustainable intervention for low-resource areas of the world.

CONCLUSION:

In the population studied in this thesis, term infants born after an uncomplicated pregnancy by healthy mothers, delayed cord clamping improved iron stores and prevented iron deficiency at 3 months of age. Infant morbidity was not affected of delayed as compared to early cord clamping, neither when regarding the neonatal period (hyperbilirubi naemia/jaundice, respiratory symptoms, polycythemia), nor the first 3 months of life (infection symptoms, gastrointestinal problems, contact with doctors).

We conclude that delaying umbilical cord clamping for 180 sec is a safe and feasible alternative when handling childbirth. Iron deficiency is significantly reduced at 3 months of age.

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