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Original Research Article

Evaluation of Neonatal Thrombocytopenia: Incidence and Causes

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Abstract

Background: Thrombocytopenia is one of the commonly encountered haematological abnormalities in neonates admitted in NICU. Various factors such as ARDS, neonatal sepsis, meconium aspiration syndrome, neonatal hyperbilirubinemia, prematurity, low birth weight and necrotising enterocolitis are associated with thrombocytopenia. Monitoring thrombocytopenia in respect to onset and severity is an important predictor for neonatal morbidity and mortality. *Material & method:* Blood samples of total 185 neonates admitted in NICU during the period of four months (November 2018 to February 2019) were evaluated; out of these, total 45 cases were diagnosed with low platelet count (count < 1.5L/ cumm). These 45 cases were evaluated for onset of development of thrombocytopenia and categorised in early onset (< 72 hrs of birth) and late onset (> 72 hrs of birth). These neonates also observed for severity of thrombocytopenia. *Observation:* Overall incidence of thrombocytopenia in present study is 41.1%. Most common etiological factor associated was neonatal sepsis followed by ARDS, meconium aspiration syndrome, neonatal hyperbilirubinemia, prematurity, low birth weight and necrotising enterocolitis. Most of the cases were presented with late onset and leading cause of thrombocytopenia among this group was neonatal sepsis in association with other factors like ARDS, meconium aspiration. All the cases of neonatal sepsis were found to have severe thrombocytopenia (platelet count < 50,000/cumm). *Conclusion:* Neonatal thrombocytopenia is very common haematological finding. It can also be considered as an important sensitive marker for neonatal morbidity specifically in case of thrombocytopenia associated with neonatal sepsis as it manifested before the culture results.

Keywords: Neonatal thrombocytopenia; ARDS; Neonatal sepsis.

Introduction

Thrombocytopenia is one of the commonest haematological abnormalities encountered in neonatal period. It is having major impact on mortality and morbidity during the neonatal period. As the foetal platelet count is above 150 × 109 /1 by the second trimester of pregnancy

and then remains fairly constant until term; thrombocytopenia in newborn is defined as platelet count below 150 × 109 /l regardless of gestational age [1]. The most threatened bleeding complication in neonatal population is intracranial haemorrhage. A study done by M. Andrew et al. has shown that there is higher risk for intraventricular hemorrhage in thrombocytopenic newborn as compared to non-thrombocytopenic newborn of similar birth weight [2].

Thrombocytopenia in neonatal period can occur due to various infections. It is one of the early indicators of neonatal sepsis with or without DIC [3]. The incidence of thrombocytopenia is high among the newborn babies admitted in intensive care unit (NICU) as compared to healthy newborns [4]. The incidence can be as high as 70% and even higher among risk groups like low birth weight babies and preterm neonates [5]. Timely identification of thrombocytopenia is very important to prevent major bleeding complications in newborns. It is also very essential to know onset and associated risk factors for neonatal thrombocytopenia; as the clinical outcome and treatment modality differs considerably [6].

Present study is aimed to assess the pattern, onset, severity and associated clinical conditions of neonatal thrombocytopenia, among newborn babies admitted in NICU.

Materials & Methods

An observational study was conducted in central clinical laboratory of pathology department and paediatric department of a tertiary care hospital of central Gujarat, for the period of four months (November '18 to February '19). The newborn babies between ages of 0 to 28 days admitted in NICU with various clinical problems were analysed for complete blood cell count. The newborn babies with platelet count <1.5 lacs/cumm were included in this study.

Venous blood samples from all the neonates collected in EDTA vaccutte designed for pediatric patients were received in central clinical laboratory of pathology department. The samples were analysed by automated blood cell counter Horiba Pentra XLR for their CBC and haematological profile and cross verified microscopically by examination of peripheral blood smear. The cases with thrombocytopenia were evaluated for associated clinical conditions.

The newborn babies with thrombocytopenia were further evaluated for onset, severity and possible causes of development of thrombocytopenia. According to onset of development, cases were categorized into early onset if thrombocytopenia developed < 72 hours of birth and late if after 72 hours of birth.

Severity of thrombocytopenia was graded as mild if counts were in the range of 100 to 150×109/L, moderate if count was > 50× 109/L to < 100× 109/L and severe if < 50× 109/L.

Observation

In present study, blood samples of total 185 patients admitted in neonatal intensive care unit were analysed. Out of these, 45 newborn babies were having thrombocytopenia (platelet count less than 150X109 /L). Overall prevalence of thrombocytopenia in neonates admitted in NICU in present study is 41.1%. Out of these 45 cases, 29 were male and 16 were females.

These 45 cases were assessed for the etiological factors associated with thrombocytopenia. Table 1 is showing frequency of various etiological factors. Out of those, most frequent cause observed to be neonatal sepsis followed by acute respiratory distress, meconium aspiration syndrome, low birth weight and prematurity,. It was also observed that in many of the cases with thrombocytopenia were having more than one etiological factors involved.

In present study, total 23 cases were having sepsis. Out of these 23, total 21 cases were confirmed by blood culture examination. 18 cases out of total 23 cases of neonatal sepsis were found in association with other factors like acute respiratory distress, meconium aspiration prematurity and low birth weight. This shows vulnerability of these infants for acquiring infection. 45 cases were also evaluated for onset of thrombocytopenia and grouped among early onset and late onset of development of thrombocytopenia. It was observed that more number of cases in present study were having late onset (> 72 hrs of birth) of thrombocytopenia as compared to early onset (Table 2).

It was also observed that, all the five cases of neonatal sepsis were presented with late onset of thrombocytopenia (> 72 hrs of birth). Whereas, factors associated with early onset of thrombocytopenia in present study were ARDS, neonatal jaundice, low birth weight and prematurity.

Total 45 cases of thrombocytopenia were classified according to severity of thrombocytopenia. (Table 3). We observed that majority of cases were having moderate degree of thrombocytopenia,

whereas only 10 cases (22.2%) were having severe thrombocytopenia. Most common factors associated with severe thrombocytopenia in present study were neonatal sepsis and low birth weight; whereas common factors associated with mild to moderate thrombocytopenia were neonatal hyperbilirubinemia, meconium aspiration syndrome (MAS) and ARDS.

Table 1: Etiological factors and no. of patients with neonatal thrombocytopenia

Diagnosis		No. of patients
Low birth weight		02
Prematurity		05
Sepsis (with CRP >6 µg)	Alone	05
	Associated with other factors	18
ARDS		16
Meconium aspiration syndrome		08
Alloimmune thrombocytopenia		00
Neonatal Jaundice		07
Necrotising enterocolitis		01
Pulmonary hypertension		01

Table 2: pattern of onset of development of neonatal thrombocytopenia observed among different etiological factors

Etiological factors for neonatal thrombocytopenia	Early onset (<72 hrs of birth)	Late onset (>72 hrs of birth)
Low birth weight	01	01
Prematurity	02	03
Sepsis (with CRP >6 µg)	00	05
ARDS	05	11
Meconium aspiration syndrome	03	05
Alloimmune thrombocytopenia	00	00
Neonatal Jaundice	03	04
Necrotising enterocolitis	00	01
Pulmonary hypertention	00	01
Total cases	14	31

Table 3: Assessment of severity of thrombocytopenia among different etiological groups

Etiological factors for neonatal thrombocytopenia	Mild *	Moderate**	Severe ***
Low birth weight	01	01	00
Prematurity	00	05	00
Sepsis (with CRP >6 µg)	00	01	04
ARDS	06	06	04
Meconium aspiration syndrome	03	04	01
Jaundice	04	03	00
Alloimmune thrombocytopenia	00	00	00
Pulmonary hypertension	00	00	01
Necrotizing enterocolitis	00	01	00
Total cases	14	21	10

Grading of severity:

* Mild (platelet count 100,000 to 150,000/µl)

** Moderate (platelet count 50,000 to 99,000/µl)

*** Severe (platelet count <50,000/µl)

Discussion

Neonatal thrombocytopenia is one of the frequent haematological findings in newborn babies admitted in NICU and also an important challenge for a neonatologist. Overall incidence of neonatal thrombocytopenia is 22 to 35% in patients admitted in NICU [6]. The incidence of thrombocytopenia in neonates varies with population studied. In present study, the incidence is 41.1%. The higher incidence is because of population studied in present study were newborn babies admitted in NICU of a tertiary care referral hospital. Similarly higher incidences have also been found in studies done by Gupta et al. and Sonam S. [5,7].

In present study, Out of total 45 cases, 29 were male and 16 were females. Various studies have shown that there is no influence of gender of newborn on development of thrombocytopenia [8,9].

It is very essential to categorise thrombocytopenia according to timing of onset, as it changes the requirement of interventions. In preterm neonates, early-onset thrombocytopenia (<72h) is usually secondary to antenatal causes, has a characteristic pattern and most of the time resolves without complications or the need for treatment. By contrast, late-onset thrombocytopenia in preterm neonates (>72h) is nearly always due to post-natally acquired bacterial infection and/or necrotizing enterocolitis, which rapidly leads to severe thrombocytopenia and such cases require platelet transfusion [10].

In present study 68.9% cases presented with late onset of thrombocytopenia as compared to 31.1% of early onset. It was also observed that all the five cases of neonatal sepsis were having late onset of thrombocytopenia. The mechanism for development of thrombocytopenia in sepsis can be increased platelet consumption or hypersplenism or both. For both early and late onset of thrombocytopenia, infection has to be considered as most important factor. Neonatal sepsis due to bacterial infection can be of particular concern when thrombocytopenia develops after 72 hrs of birth. Thrombocytopenia in such cases serves as a sensitive marker for infection, as it appears long before confirmation of culture report comes. Many clinicians consider treating with antibiotics to cover for occult infection if the etiology for thrombocytopenia is not apparent.

In present study, most of the cases were having mild to moderate thrombocytopenia and as compared to only 10 cases were having severe thrombocytopenia (platelet count <50,000/µl). The studies done by other authors also got similar results.

It is also important to assess the severity of thrombocytopenia, as monitoring of platelet count in preterm newborn will form an important guideline for the requirement of platelet transfusions. In a study done by Sonam S. et al. most of the cases with severe thrombocytopenia were having prematurity and septicaemia [7]. Similarly, Most common factors associated with severe thrombocytopenia in present study were neonatal sepsis alone as well as associated with other factors; whereas common factors associated with mild to moderate thrombocytopenia were neonatal hyperbilirubinemia, meconium aspiration syndrome (MAS) and ARDS.

Conclusion

Neonatal thrombocytopenia is one of the common haematological finding in new born babies. As the prevalence of thrombocytopenia is high among the newborn babies admitted in NICU, it is very important to assess and monitoring platelet count in each and every patient admitted in NICU. Important factors associated with low platelet count are neonatal sepsis, prematurity, low birth weight, ARDS, Meconium aspiration syndrome, neonatal hyperbilirubinemia. It also very important to monitor severity and timing of onset of thrombocytopenia, as this is having impact on treatment modalities and usage of platelet transfusions. Neonatal sepsis is most important factor to be considered for both early and late onset of thrombocytopenia. Monitoring platelet count in premature neonates with thrombocytopenia is very essential as they are having greater risk of developing severe bleeding complications like intraventricular hemorrhage as compared to non-thrombocytopenic neonates. Thrombocytopenia individually can be considered as a predictive marker for clinical outcome in certain conditions like sepsis. Still there is a need of a study to establish proper guidelines and defined thresholds for establishing treatment modality and use of platelet transfusions.

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