Incidence of thrombocytopenia in the neonatal intensive care unit

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ABSTRACT

BACKGROUND

Thrombocytopenia is the commonest haematological abnormality encountered in the neonatal intensive care unit (NICU). The incidence in neonates varies greatly, depending upon the population studied. The aim of the present study was to study the incidence of thrombocytopenia in the neonates admitted to the NICU.

METHOD

The study was carried out in 258 consecutive eligible neonates from August 2007 to August 2009. Neonates were placed in two risk groups for thrombocytopenia, viz. high risk and low risk, depending upon the presentation, maternal history and any antenatal/perinatal events. Platelet counts were done on the first, third and fifth day of admission and thereafter every 72 hours till counts were normal. Low counts were collaborated with a peripheral blood smear.

RESULTS AND CONCLUSION

The overall incidence of thrombocytopenia in the study group was 70% (182/258). The incidence in the high-risk group was 93.7% cases (134/143) and in the low-risk group was 41.7% (48/115). This difference was statistically significant. Factors associated with thrombocytopenia were sepsis, extreme low birth weight, intra-uterine growth restriction, birth asphyxia and pre-eclampsia in mothers. The most common severe bleeding manifestation was pulmonary haemorrhage. The overall mortality in babies with thrombocytopenia was 33% despite >90% of these cases having received platelet transfusion. Of these pulmonary haemorrhage was the main cause of death in five cases. It is concluded that thrombocytopenia is very common in the NICU and should be actively looked for so that it can be managed appropriately.

MJAFI 2011;67:234–236

Key Words: early onset thrombocytopenia; late onset thrombocytopenia; neonatal thrombocytopenia

INTRODUCTION

Thrombocytopenia is the commonest haematological abnormality encountered in the neonatal intensive care unit (NICU) after phlebotomy induced anaemia.¹ Platelets first appears in the foetus by 5–6 weeks of post-conceptual age.² Thrombocytopenia is defined as platelet count <150,000/mm³ regardless of the gestational age.³ Multiple disease processes can cause neonatal thrombocytopenia, and this can be early-onset thrombocytopenia (<72 hours) or late-onset thrombocytopenia (>72 hours).⁴ The incidence of neonatal thrombocytopenia varies greatly, depending upon the population studied, from <1% in healthy term babies to around one third of neonates admitted to NICU.⁵ Though thrombocytopenia is so prevalent it is often ignored in the surmise that that it will resolve spontaneously. However, thrombocytopenia, if not managed appropriately, can result in devastating consequences like intracranial haemorrhage and pulmonary haemorrhage, particularly in the preterm baby.

METHOD

This was a prospective observational study carried out on 258 consecutive eligible neonates admitted to NICU over a period of two years from August 2007 to August 2009. Three hundred consecutive babies admitted to the NICU were considered for the study out of which 258 were included. Babies were excluded if they died or were discharged before 72 hours of admission. Neonates were placed in two groups, viz. high risk and low risk for thrombocytopenia, depending upon the presentation, maternal history, any antenatal/perinatal events.

High-risk Group

This group included babies with obvious bleeding, those with suspected or confirmed sepsis (proven on culture), babies having significant birth asphyxia (requiring resuscitation for >30 seconds), babies with intra-uterine growth restriction (IUGR), extreme low birth weight (ELBW) babies (birth weight <1000 g), babies born to mothers with a known disorder causing thrombocytopenia (Rh isoimmunisation, pregnancy induced hypertension, platelet disorders in mother or mothers on drugs causing thrombocytopenia), neonates with suspected or proven necrotising enterocolitis (NEC), babies with suspected or proven intrauterine infections and neonates with congenital syndromes associated with thrombocytopenia (Down's, Turner's, TAR, etc.).

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Received: 28.07.2010; Accepted: 01.04.2011
doi: 10.1016/S0377-1237(11)60048-8

Low-risk Group

This group included babies with hyperbilirubinemia unrelated to the above high-risk conditions, babies with insignificant birth asphyxia requiring only stimulation, free flow oxygen or bag and mask ventilation for 30 seconds, preterms with a primary diagnosis of respiratory distress syndrome, babies with meconium aspiration syndrome without significant birth asphyxia or IUGR, low birth weight (LBW) (babies weighing between 1,500 and <2,500g) and very low birth weight (VLBW) (neonates weighing >1,000g but <1,500g) who were not growth restricted or sick and were admitted only for routine care.

Platelet count was carried out on the first, third and fifth days after admission to NICU. In bleeding neonates or those with low platelet, further counts were done every 72 hours for as long as required. This was done on venous EDTA samples on a Coulter counter. Thrombocytopenia when present was collaborated by a peripheral blood smear. Thrombocytopenia was defined as platelet count <150,000/mm³. Mild thrombocytopenia was defined as counts of 100,000–<150,000/mm³, moderate thrombocytopenia as counts between 50,000 and <100,000/mm³ and severe thrombocytopenia as counts <50,000/mm³. Standard treatment guidelines for platelet transfusions were followed for management of thrombocytopenia as tabulated below.^{1,9}

Clinical condition

Stable and non-bleeding neonate

Unstable, <1,000 g or bleeding neonate

Severe bleeding, DIC or requiring surgery

Platelet count

<30,000/mm³

<50,000/mm³

<100,000/mm³

RESULTS

There were 143 babies in the high-risk group and 115 babies in the low-risk group. The demographic characteristics of the infants are shown in Table 1.

The overall incidence of thrombocytopenia in the study group was 70.5% (182/258). This was 93.7% (134/143) of the high-risk group and 41.7% (48/115) of the low-risk group (Figure 1). Using the Pearson's χ^2 test this difference was found to be statistically significant with $P < 0.05$. Of all cases of thrombocytopenia 72% were late onset (>72 hours) thrombocytopenia.

Grades of thrombocytopenia are shown in Figure 2. Sepsis was the most common main high-risk factor for thrombocytopenia (42/143). Other risk factors included ELBW babies, babies with IUGR, those born to pre-eclamptic mothers and babies with birth asphyxia.

Around 55.9% (75/134) of cases of thrombocytopenia in the high-risk group had bleeding manifestation Figure 3. This was in the form of petechiae in 40% (30/75) followed by pulmonary haemorrhage in 33.3% (25/75) cases, bleeding from multiple sites in 24% (18/25), and intraventricular haemorrhage in 2.7% (2/75). Out of the 48 cases of thrombocytopenia in the low-risk group only 19.5% (10/48) babies had bleeding

Table 1 Weight and sex distribution of the study population.

Birth weight (Kg)	Male	Female	Total
<1	22	17	39
1–2.5	70	68	138
>2.5	45	36	81
Total	137	121	258

Figure 1 Incidence of thrombocytopenia in study population.

Figure 2 Grades of thrombocytopenia.

manifestations of which 9 babies had petechial haemorrhages and one had pulmonary haemorrhage. No baby in this group had intraventricular haemorrhage or DIC.

Of the 182 babies with thrombocytopenia, 63 babies (34.5%) fell below the safe limit criteria and received single or multiple platelet transfusions. Around 61/182 (33.5%) babies in our study who has thrombocytopenia succumbed. Of these 97.5% had received platelet transfusion. However, in none of these cases was bleeding the primary cause of death.

Figure 3 Main high-risk factors associated with thrombocytopenia.

DISCUSSION

Thrombocytopenia is the one of the most common haematological abnormalities seen in the NICU but may be missed if not specifically looked for. Several studies have reported thrombocytopenia in 22–35% in all infants admitted to the neonatal intensive care unit.^{6,7} Despite its high prevalence, several basic patho-physiologic questions regarding neonatal thrombocytopenia remain unsolved.

The overall incidence of thrombocytopenia in our study group was 70.5%. Severe thrombocytopenia accounted for 34.4% (62/182) of cases while mild to moderate thrombocytopenia accounted for in 66.5% cases. Several workers have in their study groups found mild to moderate thrombocytopenia in 80% cases.^{7,9}

The reason for a higher incidence of thrombocytopenia in our study was probably because the incidence of sepsis in our group was high. This has been shown in other studies as well.⁸ Thrombocytopenia occurs more frequently in association with certain factors like sepsis, ELBW, severe birth asphyxia, babies born to pre-eclamptic mothers and low birth weight babies and this was seen in our study as well. Though it is less common in babies with meconium aspiration, hyper bilirubinemia, mild birth asphyxia and respiratory distress syndrome, in our study moderate thrombocytopenia was found in 13.0% cases (16/115) and severe thrombocytopenia was found in 2.6% (3/115) in this group as well.

There are conflicting reports as regards the association of thrombocytopenia with intraventricular haemorrhage. Though no association has been found by some authors like Lupton et al,¹⁰ Beiner et al¹¹ in their study had found a strong correlation between neonatal thrombocytopenia and IVH particularly between grades 3 and 4. We did not find any increased incidence of IVH in our severely thrombocytopenic babies. Instead pulmonary haemorrhage was the most common severe bleeding

manifestation in our study. This has not been collaborated by other studies.¹²

To conclude it is important to look for and appropriately manage thrombocytopenia in all babies admitted to NICU even in apparently low-risk babies as incidence and mortality associated with this condition is high.

Intellectual Contributions of Authors

Study concept: Surg Capt SS Mathai

Drafting and statistical analysis: Surg Lt Cdr Aparajita Gupta

Manuscript revision: Surg Lt Cdr Aparajita Gupta,
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CONFLICTS OF INTEREST

None.

REFERENCES

1. Roberts I, Murray NA. Neonatal thrombocytopenia. Diagnosis and management. *Arch Dis Child Fetal Neonatal Ed* 2003;88:F359–F364.
2. Hann IM, Gibson BES, Letsky E. Development of blood in the fetus. In: *Fetal and Neonatal Hematology* 1st ed. 2002:541–564.
3. Holmberg L, Gustavii B, Jonsson A. A prenatal study of fetal platelet count and size with application to the fetus at risk of Wiskott Aldrich syndrome. *J Pediatrics* 1983;102:773–781.
4. Forestiere F, Daffos F, Galacteros F. Haematological values of 163 normal fetuses between 18 and 30 weeks of gestation. *Pediatrics* 1986;20:342–346.
5. Forestiere F, Daffos F, Catherine N. Developmental hematopoiesis in normal human fetal blood. *Blood* 1991;77:2360–2363.
6. Sola-Visner M, Saxonhouse MA, Brown RE. Neonatal thrombocytopenia—What we do and don't know? *Early Hum Dev* 2008;84:499–506.
7. Roberts IAG, Murray NA. Neonatal thrombocytopenia. *Current Opinion Pediatrics* 2001;13:16–21.
8. Charoo BA, Iqbal JI, Iqbal Q, et al. Nosocomial sepsis-induced late onset thrombocytopenia in a neonatal tertiary care unit: a prospective study. *Hematol Oncol Stem Cell Ther* 2009;2:349–353.
9. Murray NA, Howarth LJ, McCloy MP, et al. Platelet transfusion in the management of severe thrombocytopenia in neonatal intensive care unit patients. *Transfus Med* 2002;12:35–41.
10. Lupton BA, Hill A, Whitfield MF, et al. Reduced platelet count as a risk factor for intraventricular hemorrhage. *American Journal of Diseases in Children* 1988;142:1222–1224.
11. Beiner ME, Simchen MJ, Sivan E, et al. Risk factors for neonatal thrombocytopenia in preterm infants. *American Journal of Perinatology* 2003;20:49–54.
12. Baer VL, Lambert DK, Henry E, Christensen RD. Severe thrombocytopenia in the NICU. *Pediatrics* 2009;124:e1095–1100.