PREVALENCE AND CAUSATIVE FACTORS OF NEONATAL THROMBOCYTOPENIA WITH SPECIAL EMPHASIS ON NEONATAL ALLOIMMUNE THROMBOCYTOPENIA THROUGH HUMAN PLATELET ANTIGEN TYPING

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Introduction

- Neonatal thrombocytopenia can be defined as a platelet count less than 150000/µL at birth, and accounts upto 20-40% of the newborns admitted in the NICU.
- Neonatal Alloimmune Thrombocytpenia (NAIT) is caused by maternal allo-antibodies against fetal platelet antigens. Most of the studies suggest that over 80% of NAIT cases results from mother and fetus incompatibility to HPA-1a.
- The most serious hemorrhagic complication of NAIT is intracranial hemorrhage.
- To the best of our knowledge this aspect of neonatal care has not been addressed in the literature from our country and limited studies have been done globally so far.

Aims and Objectives

Aim:

Study on prevalence and causative factors of Neonatal Thrombocytopenia with special emphasis on Neonatal Allo-immune Thrombocytopenia (NAIT).

Objectives:

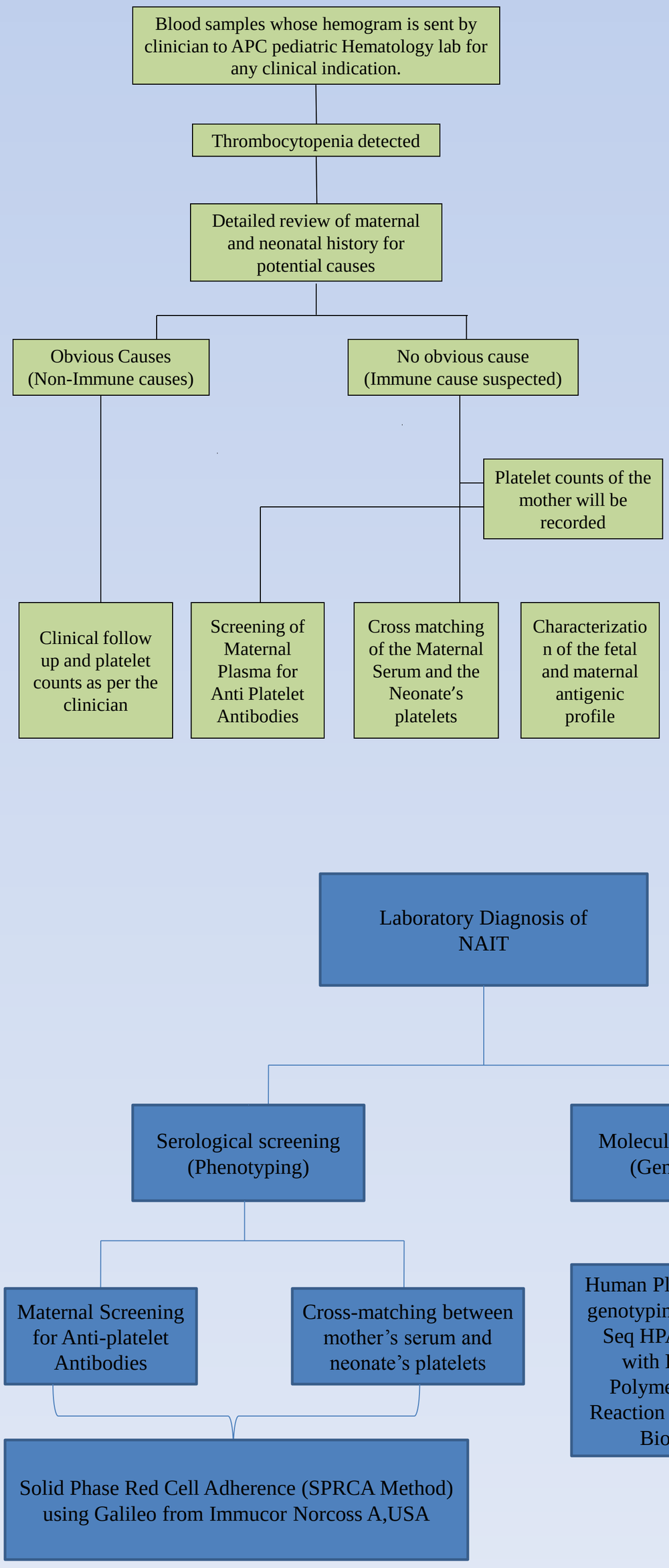
- To determine the frequency of thrombocytopenia in neonates admitted in the Newborn Unit of Pediatric Emergency (NUPE) and new born unit.
- To study the clinical course of thrombocytopenia, in neonates and categorize them with appropriate laboratory work up including neonatal sepsis.
- To perform maternal screening for Human Platelet Antigen (HPA) antibodies and platelet cross matching to determine neonatal and maternal incompatibility
- Comparative genotypic analysis of the neonatal and maternal platelet antigenic profile to understand the basis of HPA allo-immunization

Methodology

The study was conducted in the department of Transfusion Medicine and neonatalogy unit of PGIMER, Chandigarh, starting from May 15th 2018-January 26th 2019 and June 15th 2019-March 20th 2020.

Following algorithm was designed to evaluate various etiologies associated to thrombocytopenia with special emphasis on Neonatal Alloimmune thrombocytopenia.

Duration of enrollments:1 year 7 months

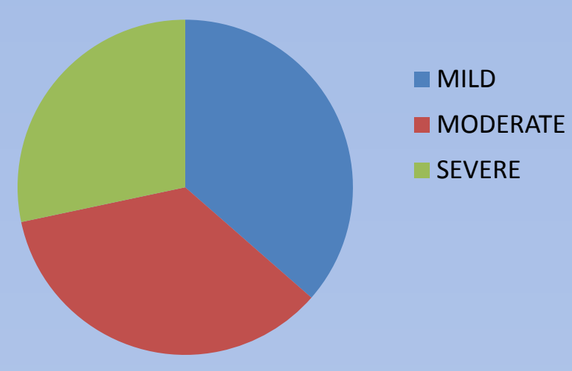


Results

Prevalence of Thrombocytopenia

Total Number of Admissions	Number of Thrombocytopenic Neonates	Prevalence of Neonatal thrombocytopenia
6237	1154	18.5%

Severity of Thrombocytopenia



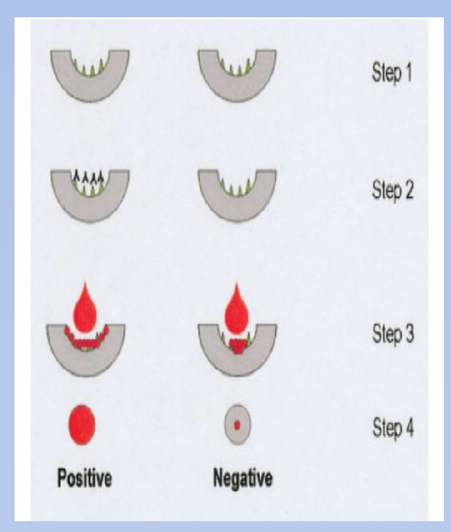
Etiologies Associated V/S Severity of Thrombocytopenia

	Mild	Moderate	Severe
Sepsis (353)	99	102	152
Birth Asphyxia (199)	80	55	64
Necrotizing Enterocolitis (30)	7	9	14
Iugr (68)	21	24	23
Syndromic (49)	24	10	15
Nait (10)	0	0	10
Pmt (122)	40	47	35
Rh ISO (21)	7	8	6

SEROLOGICAL ANALYSIS OF SUSPECTED NAIT CASES

CASE ID	MATERNAL ACREENING FOR ANTIPLATELET ANTIBODIES	INCOMPATIBILITY TESTING BETWEEN MOTHER AND NEONATE
001	POSITIVE	POSITIVE
002	POSITIVE	POSITIVE
003	POSITIVE	POSITIVE
004	POSITIVE	POSITIVE
005	POSITIVE	NEGATIVE
006	INVALID	NEGATIVE
007	INVALID	POSITIVE
008	POSITIVE	POSITIVE
009	POSITIVE	POSITIVE
010	POSITIVE	POSITIVE

INTERPRETATION OF SPRCA BASED SEROLOGICAL TEST



Negative test: Button of Indicator Red Cells at the bottom of the test well with no readily detectable area of adherence.

Positive test: Adherence of Indicator Red Cells to part or the entire reaction surface.

HUMAN PLATELET ANTIGEN TYPING USING REAL TIME POLYMERASE CHAIN REACTION(RT-PCR)

Cases	Antigens causing allo-immunization
Case 001	HPA-11b
Case 002	HPA-15b
Case 003	HPA-9b, HPA-3b
Case 004	HPA-9b, HPA-3b
Case 005	HPA-3b, HPA-10a
Case 006	HPA-10a, HPA-2a
Case 007	HPA-11a
Case 008	HPA-5b
Case 009	HPA-3a, HPA-3b, HPA-8a
Case 010	HPA-3b

CONFIGURATION OF THE LINKSEQ HPA GENOTYPING TRAY

1	2	3	4	5	6	7	8	9	10	11	12
A	S	S	S	S	S	S	S	S	S	S	S
B	S	S	S	S	S	S	S	S	S	S	S
C	S	S	S	S	S	S	S	S	S	S	N
D											
E	S	S	S	S	S	S	S	S	S	S	S
F	S	S	S	S	S	S	S	S	S	S	S
G	S	S	S	S	S	S	S	S	S	S	N
H											

Discussion

➢Thrombocytopenia, presenting in the first 72 hours of life is usually due to placental insufficiency and caused by decreased platelet production. Most of these events are generally mild or moderate and resolved spontaneously; however, can be more severe and prolonged in thrombocytopenia, presenting after 72 hours of age due to Sepsis or Necrotizing Enterocolitis (NEC) and can be grouped under non immune causes of Thrombocytopenia

➢Neonatal Alloimmune Thrombocytopenia (NAIT) is defined as a fetal neonatal platelet count of less than 150,000/µL resulting from maternal sensitization to incompatible fetal platelet antigens. Although it is a rare condition, it is the most common cause of severe thrombocytopenia (platelet count of less than 50,000/µL) , in the fetal and neonatal period and the most common cause of inter cranial hemorrhage in term infants.

➢Neonatal alloimmune thrombocytopenia is equivalent of hemolytic disease of the new born, is caused by transplacental passage of maternal alloantibodies directed against fetal platelet antigens inherited from the father but absent on maternal platelets. The most commonly detected antibodies are those directed against human platelet antigen (HPA)-1a and HPA-5b, which are responsible for 80% and 10-15% of cases respectively, however the antigen causing alloimmunization encountered in our setup was HPA-3b, HPA-10a and HPA9b

➢We made an attempt to formulate an algorithm and standardize various laboratory techniques for investigation of NAIT cases in the Department of Transfusion medicine and Pediatric Hematology in the Department of Advanced Pediatric Centre (APC).

Conclusion

• Overall prevalence of neonatal thrombocytopenia in our set up was 18.5% and the prevalence of NAIT was 1.09%, in 1154 thrombocytopenic neonates .The most prevalent incompatibility was due to HPA-3b followed by HPA-10a and HPA-9b

References

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