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Anti-N ANTIBODIES - A CASE REPORT

Medical Science

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ABSTRACT

The MNS antigen system is a human blood group system based upon two genes; glycophorin A and glycophorin B, located on chromosome number 4. There are currently 46 antigens in the system (1,2) , but the five most important antigens are M,N,S,s and U. Most anti-N antibodies are naturally occurring IgM antibodies, and not active above 25˚C and are not clinically significant. Anti-N reacting at room temperature can be a cause for ABO blood group discrepancy. IgG anti-N antibodies have also been described. Immune anti- N antibodies resulting from multiple transfusions do occur. We have reported a case presented with polytrauma who required blood transfusion. Blood group discrepancy was observed and further work up suggested the presence of anti-N antibodies.

INTRODUCTION:

MNS blood group system was the second to be discovered by Landsteiner and Levine in 1927 after ABO blood group system. Because the antigens were clearly related but not exactly antithetical, they named them respectively, after the second and fifth letters of the word immune. Among antibodies of MNS blood group system, anti-M is relatively common naturally occurring antibody (3). Anti-N is relatively rare compared with anti-M (4). Antibodies to M and N blood group antigens are associated with variable clinical significance as both IgG and IgM

type of antibodies are frequently encountered. Most anti-N antibodies are of IgM type and not considered clinically significant (5). Anti-N antibodies have been implicated as the cause of hemolytic transfusion reactions and mild hemolytic disease of fetus and newborn (6). Anti- N antibodies have been reported in dialysis patients due to cross-reactions with the residual formaldehyde which was used for sterilizing the equipment.

CASE DETAIL:

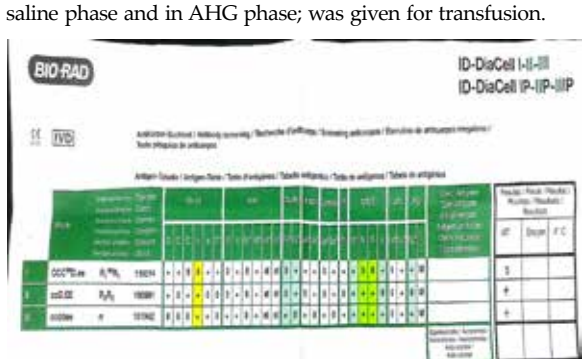
An 85 year old man having road traffic accident; presented with multiple injuries involving both the limbs was admitted at V.S.General Hospital, Ahmedabad. He was having fracture of shaft of left femur with bilateral humerus fracture. He had no documented history of previous blood transfusion. Laboratory investigations included complete blood count and all serological tests. Results were within normal range except Hemoglobin (Hb) which was 11 gm%.

Blood samples were received at our Blood Bank with request of two units of packed red blood cells. Blood grouping was done using conventional tube technique and Gel technique. It showed preliminary blood group as A Rh D Positive, but in the reverse grouping the patient's serum showed positive reaction with pooled A, B & O red cells with negative autocontrol. It was reported as blood group discrepancy. Further investigations like direct antiglobulin test (DAT) and indirect antiglobulin test (IAT) were done. IAT showed positive result (+2 agglutination) and DAT showed negative result (No agglutination). Unexpected antibodies were suspected in patient's serum. Three cell screening panel (Diacell , Biorad, 1785, Cressier FR. Switzerland) revealed positive reaction (+4 agglutination) in 2nd and 3rd panel and negative reaction (No agglutination) in 1st panel. This suggested possibility of Anti-c, Anti-N or Anti-S antibodies.

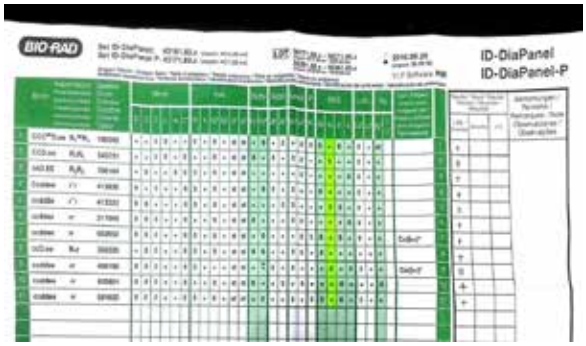
For exact typing of these unknown antibodies, blood sample was sent at Department of IHBT Civil Hospital, Ahmedabad. Eleven cell screening panel was kept. It showed negative result with 2nd, 5th and 9th panel of cells while remaining cell panels showed positive reaction (+4 agglutination). It was suggestive of antibodies with anti-N specificity.

Thermal amplitude of the antibodies was determined by tube testing at room temperature and at 37°C. The antibody was reactive at room temperature and also at 37˚C in AHG phase. Antibody screening with three cell screening panel was performed by electro magnetized technique (DIAGAST, France); which gave negative reaction in all panels. This suggested the presence of IgM type of antibody, as DIAGAST antibody screening system detect only IgG type antibody. As antibodies were also reactive at 37°C in AHG phase, possibility of Anti-N IgM type antibody with thermal amplitude at 37o C could not be ruled out.

The red cells with N- were compatible with patient's serum in saline phase and in AHG phase; was given for transfusion.



Three cell screening panel



Eleven cell screening panel

DISCUSSION:

The MNS blood group system is second only to the Rh blood group system in its complexity. Many alloantibodies to antigens in the MNS system are not generally clinically significant although antibodies to low-prevalence and high-prevalence MNS antigens can cause hemolytic disease of the fetus and newborn.

The MNS antigens are carried on glycophorin A (GPA) , glycophorin B (GPB), or hybrids thereof, which arise from single-nucleotide substitution, unequal crossing over, or gene conversion between the glycophorin genes(7).

Anti- N is very rare and has similar reactivity as anti-M. Various authors reported the prevalence of anti-M ranging from 3.6% to 13.8%, whereas frequency of anti-N is reported to be in the range of 0.87-1.47%.(8,9)

Antibodies to M and N blood group antigens are associated with variable clinical significance; as both IgG and IgM type of antibodies are frequently encountered. Anti-N is usually not active at 37°C. It can generally be ignored in transfusion practice and if the room temperature incubation is eliminated from compatibility testing and screening for antibodies, antibody will usually not be detected (10). However, anti-N antibodies reactive at 37°C are considered clinically significant & can cause hemolytic transfusion reaction. Most of the authors confer that whenever M or N antibodies active at 37°C are encountered, antigen-negative or red cells compatible by an IAT should be provided. (11)

Antigens in the MNS system are fully developed at birth. Therefore a mother who is negative for one of these antigens could be stimulated to make antibodies that may cause HDN. Anti-N is also seen in renal patients, regardless of their MN type, who are dialyzed on equipment sterilized with formaldehyde. Dialysis-associated anti-N reacts with any N + or N- RBC treated with formaldehyde and is called anti-Nf. Formaldehyde may alter the M and N antigens so that they are recognized as foreign. Because anti-Nf does not react at 370 C, it is clinically insignificant in transfusion.(12)

CONCLUSION:

The anti-N antibody in our case was possibly of IgM type reactive at room temperature and having thermal amplitude at 37°C. So, it was considered as clinically significant antibodies capable of causing Hemolytic transfusion reaction (HTR). Anti-N antibodies could be detected at an earlier stage because of blood group discrepancy & so HTR could be prevented. Reverse grouping with N− pooled ABO reagent red cells had also resolved patient's blood group discrepancy.

Anti N antibodies with a higher thermal range, which would otherwise be termed clinically insignificant, will induce in vivo hemolysis in patients. Therefore, the thermal amplitude of the antibody must always be determined and if judged to be clinically significant, corresponding antigen negative blood must be provided.

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