Acute Renal Failure in a Case with the Rare Bombay Blood Group

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ABSTRACT

Introduction: Bombay blood group is a very rare blood group. Individuals with the Bombay phenotype can receive only autologous blood or blood from another Bombay blood group. Transfusing other blood group to them can cause a fatal hemolytic transfusion reaction.

Case report: In this study, we report a case with the rare Bombay blood group that was misdiagnosed as the O blood group and developed a hemolytic transfusion reaction with acute renal failure and later completely recovered. This highlights the importance of typing in ABO blood grouping and standard cross-matching and performing standard pretransfusion laboratory tests in hospital blood banks in order to detect Bombay blood group.

Conclusion: Serum typing or reverse blood grouping along with O control cells and also antibody screening is the need of time.

Keywords: RBC-red blood cell, bombay blood group, transfusion reaction, acute renal failure

INTRODUCTION

Bombay phenotype is one of the rarest ABO blood groups. Blood group of a individual is determined by the antigen present on their surface. The antigens of ABO group (A, B, and H) consist of complex carbohydrate molecules. The expression of A and B antigens is determined by the presence of H antigen on precussor red blood cells. H antigen can be synthesized by H gene which is located on chromosome 19 and give rise to glycosyltransferase that add L-fucose to a precursor substance to produce H antigen on red cells. H antigen is an essential substance to A transferase or B transferase which are encoded by the ABO genes located on chromosome 9.[1] A and B transferases convert H antigen into either A or B antigens, respectively. Individuals with extremely rare Bombay phenotype fail to express H transferase. They cannot synthesize A or B antigens, and ABH antigens are absent from their red cells, regardless of their ABO blood group genotype.[2,3] Since their red cells do not react with anti-A, anti-B, and anti-AB antiserums, they can be recognized as the O blood group in cell typing. Their plasma contains anti-A, anti-B, and strong anti-H which can be hemolytic and is reactive with all blood types except the Bombay phenotype. As a result, individuals with the Bombay phenotype can only be safely transfused with autologous blood or other Bombay red cells

CASE REPORT

A 25-year-old woman was referred to our hospital with acute renal failure. Before admission to our hospital she was admitted to peripheral hospital and was diagnosed to have acute febrile illness and she was given blood transfusion with 'O' blood group.

During transfusion of O red blood cells in the peripheral hospital she developed nausea, restlessness, back pain, fever, and chills and latter after two days of blood transfusion her urine output decreased and she was referred to our hospital which is a teritiary referral hospital for kidney diseases. After admission to our hospital she was evaluatedand was found to have mismatched transfusion reaction – unconjugated bilirubin was raised,indirect coombs test was positive,serum haptoglobin was low (<0.27gm/l], and serum LDH was raised. In reverse typing, her serum showed strong agglutination with O group control cells. The results of antibody identification showed the presence of a strong antibody which reacted with all panel cells through a wide thermal range with a negative autocontrol and she was diagnosed to have Bombay blood group. she had severe renal failure with a serum creatinine of 7.7, and calculated GFR<10 and she was oliguric. she was given eight session of hemodialysis and one blood transfusion with Bombay blood group was given since she had severe anaemia with hemoglobin of 5.4 and found to have iron deficiency anaemia.She completely recovered from renal failure within 25 days and her discharge serum creatinine was 0.9.

DISCUSSION

The Bombay phenotype was first explained in 1952 in india.[1,4] The incompatibility of bombay blood group with several O blood group donors has been explained. The prevalence of Bombay phenotype is very common in India (1:10,000)

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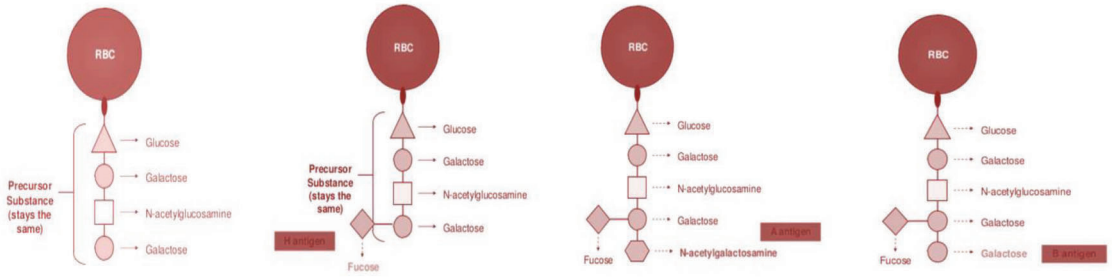

Structure of precussor RBC with intial H antigen formed by addition of fucose molecule. ' A' blood group with A antigen formed with N-acetylglucosamine addition and will have few H antigen. 'B' blood group with B antigen formed by adding galactose and will have few H antigen. AB blood group will have both A and B antigen and with were less H antigen. 'O' blood group have only H antigen. Persons with Bombay phenotype blood group will have no H,A,B antigen. But they will have anti-A, anti-B anti –H antibodies hence they will have incompatability with all blood group transfusion except they are compatable only with another Bombay phenotype blood group. Concentration of H antigen in various blood group is as follows, $O>A_2>B>A_2B>A_1>A_1B$

compared to other population like $1:10^6$ in Europe[1,4], in Caucasian with an incidence of one in 250,000.[1,4] Individuals with the Bombay phenotype are easily misdiagnosed as the O blood group in cell typing because no A or B antigen on RBC surface and because of the presence of strong anti-H in their plasma, if they receive blood group O red cells or any other blood group red cells except the Bombay group, they may develop an acute hemolytic transfusion reaction. This reaction can cause acute renal failure or disseminated intravascular coagulation (DIC) which is associated with high morbidity and mortality rates.

CONCLUSION

Hence in order to decrease transfusion reaction in patient with Bombay blood group, serum typing or reverse blood grouping along with O control cells and also antibody screening in every blood bank should be done.

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