A Rare Blood Group Found In Bangladeshi Population

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Abstract

In 2007 a 60 years old anaemic male patient was reported in Transfusion Medicine Department of BIRDEM with a request of "O" Rh D positive red blood concentrate. During routine compatibility test with his known "O" positive party donor, incompatible result was revealed. Grouping of both patient and donor done with double checking in cell typing and serum typing procedure. With Anti-H lectine negative reaction occurred in patient and positive reaction in donor. Donor was confirmed as "O" Rh D positive, but the recipient showed rare Bombay blood group.

Key Words: *Bombay blood group, O blood group*

Introduction

The Bombay blood group is a rare blood group , phenotypes of this group lacking H antigen on the red cell membrane and have anti-H in the serum[1,2,3]. It fail to express any A, B, or H antigen on their red cells or other tissues[2,3,4].The existence of a human H/h genetic polymorphism was first established by Bhende etal. As first discovery in Bombay (Mumbai), in India in 1952[2,3] of an individual devoid of the H antigen on red cells, who has antibodies in plasma reacting with all the cells exhibiting the normal red cell ABO phenotypes; so the name of this rare blood group is known as Bombay blood group[3]. People having Bombay phenotype are mostly confined to the southeast Asia[3]. In Bangladesh till now only four persons with Bombay (Oh) blood group have been reported. Among them 3 (three) sisters of a same family have been documented as Bombay blood group[6]. Around 179 persons in India with a frequency of 1 in 10,000 have "Bombay Blood group[1,2,3]. A high level of consanguinity present among the parents of the Bombay phenotype. The classic Bombay phenotype has been reported in those of Indian descendent. It is quite rare in Caucasian with an incidence of 1 in 250,000[4,5,6]. The Bombay blood group is a rare blood group which can easily be misinterpreted as 'O' blood group by routinely practiced forward or cell grouping in Bangladesh. When misdiagnosed, this Bombay group can cause fatal haemolytic transfusion reaction[2-4, 7-12]. In our country there is routine practice of "only forward grouping" by voluntary blood donors organization and various blood banks. So there is tremendous chance of misinterpretation.

Case study

A 60 years old male was reported in Transfusion Medicine Department of BIRDEM with anaemia. His positive finding showed that, haemoglobin value was 9 gm/dl. He was diabetic; fasting blood sugar was 8.5 gm /dl, after 75gm glucose (OGTT) 11 gm/dl and Hb A1c was 6.4. His blood pressure was 140/90 mm of Hg on tab. Osartil (50 mg) 1+0+1 and tab Amdocal (5mg) 1+0+1, serum creatinine was 1.2mg/dl. Other parameters were normal. With advice of blood transfusion his blood sample was sent to the transfusion medicine department for cross matching. His blood group was known as "O" Rh D positive blood group which was done previously in a center by finger prick method. For correction of his anaemia one unit of whole blood was taken properly in an aseptic procedure, from a properly selected party donor under WHO and national safe blood transfusion programme guideline. A sphygmomanometer was used to monitor and maintain his blood flow under a sustained pressure of 100 mm of Hg in between his systolic and diastolic blood pressure, which was 120/60 mm of Hg. 5 cc of blood was taken in a sterile test tube, after completion of donation, from his left anti-cubital vein, where needle of CPDA-1 blood bag was inserted and which was clumped by an artery forcep before letting the blood. This blood sample was taken as post donation basis after blood bag was separated by a sterile scissor. The sample was left for one hour in room temperature for separation of cell and serum. With this 5cc blood routine compatibility test and screening procedure was performed with 'separated serum and four times

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washed red cell' of both donor and recipient. Compatibility test also rechecked with a sample taken from blood bag. During routine compatibility test with this known "O" positive party donor , incompatible result was revealed. Then again 3cc blood in a sterile plain test tube was taken and grouping of that patient was done again both in cell typing and serum typing procedure. Strong agglutination reaction (4+) was shown with panel "O" cell in reverse grouping procedure. In all stage of cross matching including saline stage, incubation at 37^0 C, albumin, enzyme and indirect Coomb's test, strong incompatibility revealed. There was also reaction with both A cell and B cell in reverse grouping procedure. With anti -H lectin patient cell showed no evidence of agglutination macroscopically and microscopically. Anti-A and Anti-B sera also showed negative agglutination with patient cell. Thus this patient presented as a rare Bombay blood group.

Table-1

Rhesus "D" positive Bombay blood group

Anti-A	Anti-B	Anti-AB	Self/Auto Control	"A"Cell	"B"Cell	"O"Cell	Anti-D	Anti-H
-	-	-	-	+	+	+	+	-

Discussion

Apparently this case with Bombay phenotype has the phenotype of O blood in cell typing or forward grouping. But in his serum or in reverse grouping there is anti-A, anti-B and anti-H. As he had Bombay phenotype, he produced antibodies to H substance ; H substance is present on all red cells except those of hh (i.e. Bombay blood group) and also produce antibody to both A and B antigens, and are therefore compatible only with other hh donors. Biochemical and molecular structure shows the A and B antigens are terminal oligosaccharides[1,4, 13-15]. If both A and B genes are present, some H-chains converted to A antigen, some converted to B antigen[1,2,7]. If H gene absent (extremely rare), no H substance can be formed, and therefore no A or B antigen. Result is Bombay Blood group[1,4, 13-15]. Thus the Bombay phenotype is characterized by mutations in fucosyltransferase[1,9-12]. Despite the designation O, Oh negative is not a sub-group of any other group, not even 'O' negative or 'O' positive. Apparently a person with Bombay phenotype has the phenotype of O blood even though genetically they might have a different blood type. and actually it is not O blood [2,4, 8-12] (Table-1). As individuals with Bombay blood group produce antibodies to H substance; this H substance is present on all red cells, except those of hh (i.e. Bombay blood group) and also produce antibody to both A and B antigens, and are therefore compatible only with other hh donors[2,3]. So in Bombay blood in serum or in reverse grouping there is anti-A, anti-B and anti-H[2,7,8,13-15]. Individuals with Bombay phenotype can only be transfused with blood and blood products from other Bombay phenotype individuals or autologous blood[2,7,9,11, 13-15]. It is important to note that in need of urgent blood transfusion usually there is no blood stock for these rare blood group .In need of blood transfusion (e.g. in scheduled surgery) these patients may bank blood as autologus blood donor but this option is not available in cases of accidental emergency[16,17]. It is desirable to develop cryopreservation facilities for rare donor units. Every blood bank can easily maintain a rare blood donor file among their regular voluntary donors[2,3,16,17].

Conclusion

As there is less available data about this blood group in our country we are not out of risk. We would like to suggest incorporation of both "cell typing and serum typing" with "O" cell control to reveal this unexplored Bombay blood group.

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