Transfusion in Blood Group A₂B with Anti A₁ Recipient

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Introduction

Two principal subgroup of blood group A are A₁ and A₂ [1]. In Indian population frequency of A₂ is 0.8% to 3.0% while frequency A₂B is 0.6 - 1.4 % [2,3]. 22-26% of A₂B individuals can have anti A₁ antibodies which reacts at temperature below 25°C and do not pose problem in transfusion [1]. Subgroups of A can result in discrepancy in ABO blood grouping and haemolytic transfusion reactions are rare [1]. We report a case of A₂B with anti A₁ antibody reactive at 37°C, which was transfused with B group blood unit.

Case Report

A 42 year old male, weighing 65 kilograms, a known chronic alcoholic was admitted with severe upper abdominal pain. Imaging investigations revealed features of acute on chronic pancreatitis. During course of hospitalisation, he had massive upper gastrointestinal bleeding. He went into hypovolemia and was managed with intravenous fluids. His haemoglobin dropped to 3.5 gm/ dl, haematocrit value was 10.1% with a normal coagulation profile and the total serum protein was 6.2 gm/dl. Urgent blood demand was placed and blood specimen for crossmatch was collected before intravenous colloid infusion.

His specimen was processed as per laid down protocol for 'urgent blood demand'. Initial rapid cell and serum grouping result revealed cell group- AB and serum group-B with Rh D positive. Simultaneously compatibility with two units of A₁B Rh positive units was undertaken and an abbreviated crossmatch (immediate-spin, saline crossmatch) at room temperature (RT) was compatible, however 3+ agglutination was noted in low ionic strength saline (LISS)-Coombs gel agglutination card at 37°C in anti human globulin (AHG) phase of major crossmatch. Further compatibility test with four available A₁B Rh units had same results. Back to basic, the blood group of the patient was repeated with 'washed RBC' by tube method; both cell and serum group was undertaken for cell group, anti A₁ lectin was also incorporated in the test. Blood group reaction was confirmed macro and microscopically (Table 1). Presence of anti A₁ was established

by undertaking serum grouping with multiple A₁ and O cells and one A₂ cell. LISS-Coombs gel agglutination card for indirect Coombs test at 37°C revealed 4+ agglutination due to patients anti A₁. The blood group of patient was confirmed as 'A₂B with anti A₁ antibodies-RhD positive'. Next step was the compatibility test for transfusion of safe blood. Due to non-availability of A₂B group blood unit, compatibility test with two units each of O Rh positive and B Rh positive was undertaken. Blood group O units had minor match problems as expected due to donor anti B, however, both B group blood units were found compatible. A decision to transfuse B units was taken. In total 6, 2 and 12 units of A₁B, O and B Rh positive group blood units respectively were subjected for compatibility test. Result of compatibility test is presented in Table 2. B group units had two types of compatibility results due to absence and presence of anti A₂, which was confirmed by using A₁ and A₂ cells.

Patient was transfused with eight units of compatible B Rh positive blood over 36 hours. His haemoglobin rose to 8.9 gm/dl. He underwent endotherapy for variceal source in gastric fundus. Patient had haemoglobin of 11.4 and 10.6 gm/dl on 12th and 20th post transfusion days respectively. His direct and indirect Coombs test with R₁R₁, R₂R₂, rr screening cells were negative on pre-transfusion and post-transfusion first, 12th and 20th days. Patient recovered from acute illness.

Discussion

A₁ and A₂ are major subgroups of Blood group A. Both subgroup cells react with anti A lectin, however anti A₁ lectin differentiate them as it does not react with A₂ cells. The blood group A₂ and A₂B are extremely rare blood groups which can cause discrepancy in ABO blood grouping [1]. At times ABO discrepancy leads to haemolytic transfusion reaction, hence it is necessary to include anti A₁ lectin in blood group test protocol. 1-8% of A₂ individuals and 22-26% of A₂B individuals have anti A₁ [1]. The higher percentage of anti A₁ in A₂B is attributed to *R101 allele which is present in 41% of A₂B individuals as against 1% in A₂ group [4].

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Table 1**Blood group of the patient**

Grouping	Cell Group					Serum Group			
Test Substance	Anti A	Anti A ₁	Anti B	Anti AB	Anti D	A ₁ Cells	A ₂ Cells	B Cells	O Cells
Test Result	1+	Negative	3+	4+	3+	1+	Negative	Negative	Negative

Table 2**Compatibility result with various blood donor units**

Donor Units	Major Match			Minor Match		
Test- Temp	Saline- RT	AHG-37°C		Saline-RT	AHG-37°C	
Test Method	Tube	Tube	Gel	Tube	Tube	Gel
A ₁ B RhD+ (6 units)	N	1+	2-3+	N	N	N
O Rh D+ (2 units)	N	N	N	3+	3+	4+
B RhD+ (9 units)	N	N	N	N	N	N
B RhD+ (3 units)	N	N	N	N	N	1+

AHG- Anti human globulin. RT- Room temperature, N-Negative/Not agglutinated (compatible)

Anti- A₁ has thermal range of up to 25°C because of which it is clinically not significant. In fact, published cases that have reported clinically significant anti-A₁ antibody are in patients who had undergone cardiac surgery using cold cardioplegia [5,6]. Cases of anti A₁ reactive at 37°C leading to transfusion reactions are rare [7,8].

In our case anti A₁ was reactive at 37°C and transfusion with A₂B group units would have been ideal but it was not available. Transfusion of O group red cell is also recommended in these recipients [1], but blood component facility was not available. We did not transfuse O group whole blood units as we anticipated anti B in plasma of O whole blood units leading to haemolytic transfusion reactions considering large volume transfusion requirements [1]. The only choice left was transfusion of B group units. In majority of B positive cases primary anti A is anti A₁, however primary anti A₂ can be encountered [1]. Nine out of twelve of cross matched units had only anti-A₁ while three had both primary anti A₁ and anti A₂ antibodies. It is well known that anti-A in B blood group donors generally have primary anti A₁ and occasionally anti A₂ [1]. In management of this case, the importance of blood grouping and AHG phase in compatibility test has been highlighted [1]. The successful transfusion of B group 'Whole Blood' units to the recipient of blood group A₂B

with anti A₁ antibody reactive at 37°C in management of life threatening condition makes this case rare.

Conflicts of Interest

None identified

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Answers to MCQs

1) b	2) b	3) c	4) a	5) d
6) a	7) a	8) a	9) c	10) c
11) a	12) a	13) d	14) d	15) b