CORRESPONDENCE

Discrepancy in Blood Grouping: Subgroups of B—Challenges and Dilemma

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Abstract Though not very frequent, blood group discrepancies are of common occurrence which must be promptly resolved for safe transfusion practices. Blood group discrepancy is defined as the non-corroboration between cell grouping and serum grouping. Variable erythrocyte antigenic expressions (qualitative and/or quantitative difference) owing to allelic heterogeneity, give rise to subgroups. Problems during blood grouping due to weakened expression of antigens are a rare cause for ABO discrepancies. Of note, subgroups of ‘B’ with decreased expression of the B antigen are of very rare occurrence in the general population. Serologically, the variants of ‘B’ can be classified into B₃, B_x, B_m and B_{cl}. Serological confirmation of such subgroups requires special immuno-haematological procedures. The current study reports 3 cases of subgroups of B (2 cases of B_m and 1 case of B_w) detected at our centre. It is important to detect and resolve discrepant ABO grouping results so as to prevent ABO mis-match transfusions. Such individuals should also be pre-emptively informed of their respective blood donor and transfusion recipient status, as well.

Keywords ABO blood group · Blood groups · Subgroups of B

Dear Editor

The discovery of ABO blood group system by Karl Landsteiner marked the advent of an era of modern transfusion medicine [1]. ABO Blood grouping is performed on

all donors and transfusion recipients and are by far, the most frequently performed tests in the faculty of transfusion medicine [2]. Though not very frequent, blood group discrepancies do occur which must be promptly resolved for safer transfusion practices. In particular, variants of blood group ‘B’ with either quantitative or qualitative differences in expression of the B antigen on erythrocyte surface are of very rare occurrence in the general population [1, 3, 4]. In lieu of the paucity of data on the subgroups of ‘B’, we aim to report 3 cases of subgroups of B, detected at our department.

Discrepant results were reported for cell and serum grouping in 3 cases (2 donors and 1 patient) while performing routine blood grouping on an automated platform (QWALYS 3, DiaGast, France). Subsequently, after ruling out the probable clerical and technical errors, repeat blood grouping was performed by conventional tube technique. The discrepancies existed even after the increase in incubation periods of both cell and serum grouping to 30 min at 22 °C and 4 °C, increased serum-to-cell ratio and retesting the enzyme-treated (Bromelain, BioRad, Switzerland) RBCs. Failure to resolve the discrepancy afterwards, led to further adsorption-elution studies with polyclonal human antisera of group B, group A, and group O individuals for adsorption at 4 °C for 1 h; heat elution at 56 °C for 10 min and then eluate test against 3 sets each of reagent red cells (A and B). To ascertain their secretor status, saliva samples were collected and further tested by haemagglutination inhibition assay.

In all 3 cases, cell grouping was consistent with group ‘O’ and serum grouping was consistent with group ‘B’, in immediate-spin at 22 °C. Adsorption-elution technique with appropriate valid controls yielded only “Anti-B” on elution. Thus, indicating the presence of weaker variants of B group. Saliva sample could only be tested for 2 cases (i.e.

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Table 1 Case characteristics

Cases	Cell grouping				Serum grouping		Adsorption-elution	Secretor status	Subgroup
	Anti A	Anti B	Anti AB	Anti H	A _{cells}	B _{cells}			
1	0	0	0	3+	4+	0	Anti B	Not Done	B _m
2	0	0	0	3+	4+	0	Anti B	None	B _w
3	0	0	0	3+	4+	0	Anti B	B, H	B _m

1 donor and 1 patient); of these 2 cases, presence of both B and H substances was detected in 1 case, whereas the other was found to be a non-secretor (Table 1). The secretor status for 2nd donor couldn't be ascertained as the donor was unable to come back to our centre for providing the saliva sample.

Subgroups of B have been reported to be more common in India in comparison to French population [5]. Based on the degree of agglutination with the monoclonal Anti-B, monoclonal Anti-AB, monoclonal Anti-H antisera, the saliva-secretor status, the adsorption-elution studies with polyclonal Anti-B antisera and the presence or absence of ABO isoagglutinins in the serum subgroups can be classified as B₃, B_x, B_m, and B_{el}, plus B_w for those that do not fit any of the other four categories [1, 3]. Based on the serological findings, we detected 2 cases of B_m. We also found 1 case of B_w, that couldn't be serologically classified into any of the subgroups of B. In our scenario, the genetic analysis could not be performed.

Detection of B_m and B_w is of prime importance, as these may be wrongly typed as blood group 'O' in the donors. These subgroups, if transfused to group 'O' recipients, can result an adverse haemolytic transfusion reaction. On the contrary, when these individuals present as transfusion recipients, they should be transfused with group 'O' red cell components and group matched/compatible plasma and platelet components. As a precautionary measure, such individuals should be informed in person and should also be issued a special blood group cards with clear mention of their respective donor and recipient status [5]. In babies less than 6 months of age, the serum grouping isn't performed which makes the serological detection of such subgroups virtually impossible. Nevertheless, molecular analysis of the genetic markers proves to be a useful tool for resolution of such grouping discrepancies. The serologically classified subgroups of 'B' thus found at our centre, required molecular confirmation through genetic analysis that might have revealed the underlying mutations.

The qualitative and/or the quantitative difference of antigens in the blood group systems warrants cautious actions so as to prevent the transfusion related adverse events due to group mismatch, especially ABO related incompatibility. All group discrepancies should be further investigated thoroughly to ascertain the accurate blood group of donors and/or patients using the technical facilities at one's disposal.

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Compliance with Ethical Standards

Conflict of interest None declared.

Ethical Approval The study presents observations made during routine laboratory work-ups for which written informed consents were taken from each individual as part of a standard protocol. No additional interventions were carried out on the study subjects; henceforth, additional ethical clearance was not sought for.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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