

B Subgroup: B_x blood Group in a Patient : A Case Report

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Abstract:

This is a report of a case of B Sub Group: B_x, first ever detected in Bangladesh, while doing compatibility test of a sample of a patient undergoing cardiac surgery. The patient was referred to the transfusion medicine department of Bangabandhu Sheikh Mujib Medical University to do cross-match with 8 proposed donors of same ABO group prior to cardiac surgery. His red cells showed weak agglutination with anti-B, anti-AB and in his serum there was potent Anti-A and weak anti-B which was not detected at 37°C. After adsorption with anti-B an elute was prepared from patient's cells which agglutinate with B and AB cells but did not agglutinate with A or O cells. The patient could be transfused with B blood but in this situation of cardiac surgery, as he should have to be kept in hypothermic condition, we transfused him with O washed red cell with AB plasma during operation. Patient was released from hospital without any complication. The weak B subgroups are: B₃, B_x & B_{el}. B₃ shows a mixed field of agglutination with anti B. B_x shows a weak agglutination and weak anti-B is found in the serum. B_{el} is not agglutinated with anti-B but is only adsorbed anti-B. With meticulous attention, cell & serum grouping of recipient and proposed donor/s to be done along with 3 phase cross-matching (Saline phase at room temp, at 4 and 37 degree Celsius temp, Indirect Coomb's Test phase) to ensure right blood to the right patient at right time.

Keywords: ABO blood grouping, sub-groups B_x, problems of RBC phenotype.

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Introduction:

The ABO blood group system is the very first human blood grouping system that remains the most important in transfusion practice. This is because of the regular occurrence of the antibodies; Anti-A, anti-B & anti-AB, reactive at 37°C and capable to cause red cell destruction in persons whose red cells lack the corresponding antigens.¹ B_x (subgroup of B) is a very rare phenotype of blood. It is wrongly typed as 'O' because the B antigen is very weakly present on red cell membrane, which can not be detected if weak anti-B is used in cell typing. Most of the ABO blood groups antibodies are IgM in nature and detected best at 4°C. Most of the laboratories are doing blood groups only by forward grouping and these results are not counter checked by doing reverse grouping. Moreover, they perform grouping in slide method in which weak antigens are not detected and as a result the persons are typed wrongly. There is no subgroup of B analogous to subgroup A₂ but various types of reacting weakly or not at all with anti-B have been described. Salman in 1976

proposed that the weak B should be used as follows: B₃, B_x & B_{el}. B₃ shows a mixed field of agglutination with anti B. B_x shows a weak agglutination and weak anti-B is found in the serum and his saliva inhibits the reaction between anti-B and B cells. B_{el} are not agglutinated with anti-B only adsorbed anti-B.^{2,3}

In the routine determination of ABO blood groups, anti-A, anti-B and anti-AB are used for testing red cells for A and B antigens. The group is checked in serum or reverse grouping by testing the serum against known A, B & O red cells. We are reporting a case of B subgroup: B_x first ever detected in Bangladesh.

Case Report:

A 46-year-old man was admitted in the cardiac surgery ward of Bangabandhu Sheikh Mujib Medical University (BSMMU) for surgical repair of Aortic valvular disease. Before operation, his blood group was identified as O +ve (positive). On the day before operation, 8 donors of O +ve (positive) came with patient's sample for cross-matching, screening etc. During cross matching, his sample was found incompatible with all the donors. Then we gave special attention in doing his ABO grouping.

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Table-I
Antibodies and antigens found in patient's sample

Anti-B	Anti-A	Anti-AB	A cell	B cell	O cell	Auto control
+	-	++	++++	+	-	-

(NB: Table-I revealed in forward grouping - B group and reverse grouping - O group)

During cross-matching with B+ve and B-ve donors, we could detect that the sample had major incompatibility at room temperature and 4⁰C but not at 37⁰C. His saliva inhibited the reaction of anti-B with B cells. So we then realized that his blood group was B_x that contains weak anti-B too. After adsorption with anti-B an elute was prepared from patient's cells which agglutinated with B and AB cells but did not agglutinate with A or O cells.

Elutes agglutinated with B and AB red cells did not agglutinate with A or O cells. B substance was present in his saliva, which inhibited the reaction between anti-B and B cells. We then advised to transfuse the patient with O washed red cell with AB plasma. All seven siblings' of the patient had blood group B+ve, the parents' blood groups could not be explored.

Table-II
Antigens and antibodies present in B blood group

Group	Sub-group	Antigens on red cell	Antibodies in serum
B	B ₃ B _x B _{el}	B	Anti-A, Anti-B*

*(weak, rare and usually cold)

Discussions:

ABO subgroups are phenotypes those differ in amount of antigens carried on red cells and for secretors soluble antigens present in the saliva. Subgroups of A are more commonly encountered than subgroups of B (AABB technical manual). There is no subgroup of B analogous to subgroup A₂ but various types of reacting weakly or not at all with anti-B have been described. Salman in 1976 proposed that the weak B should be used as follows: B₃, B_x & B_{el}.

Subgroups are characterized by decreasing numbers of antigen sites on the red cells and the reciprocal increase in H antigen activity.^{5,6} Subgroups are more often recognized when there is a discrepancy between the red cells and serum grouping. Most of the laboratories are doing blood groups only by forward grouping; these results are not checked by doing Reverse grouping. Moreover, they perform grouping in slide method in which weak antigens are not detected and as a result the persons are typed wrongly.

Conclusions:

Usually subgroups are wrongly typed as O, which may cause HTR (Hemolytic Transfusion reaction), leading to death.^{8,9,10} B₃ shows a mixed field of agglutination with anti B. B_x shows a weak agglutination and weak anti-B is found in the serum. B_{el} cells are not agglutinated with anti-B only absorbed anti-B.^{11,12}

Meticulous attention to cell & serum grouping of recipient and proposed donor/s to be done along with 3 phase cross-matching (Saline phase at room temp, 4 and 37 degree Celsius temp, ICT phase) to ensure right blood to the right patient at right time.

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