A_{INT} blood group: A case report on rare subtype of blood group A

Dear Sir,

A1 and A2 are the two most commonly encountered subgroups of blood group A. A1 represents the majority of group A donors characterized by approximately 1 million A antigen epitopes per red cell, whereas A2 possesses only one-fifth the number of A antigen sites as A1. In routine testing, both A1 and A2 are strongly agglutinated by anti-A antiserum. However, A1 can be distinguished from A2 by anti-A1 lectin of *Dolichos biflorus*, which agglutinates A1 red cells but not A2 red cells. As the A2 phenotype reflects the inefficient conversion of H to A antigen, A2 red cells have increased reactivity with the anti-H lectin of *Ulex europaeus*.[1] Plasma from A_{int} individuals contains a special blood group transferase (UDP-GalNAc: 2′-fucosylgalactoside-a-3-N-acetylgalactosaminyl transferase) enzyme, which is different from the enzyme in A1 and A2 plasma. This A_{int} enzyme shows a strong affinity to UDP-GalNAc and low affinity to 2′-fucosyllactose, which is a soluble analog of H-substance.[2] The role of subtyping group A is of critical importance when done in the setting of incompatible (A2-O) organ transplantation, as A2 organ can be transplanted to O recipient. Some studies have been performed on weak subgroups of the ABO system, but cases of "A-intermediate" (A_{int}) subgroup in India are underreported.

We encountered a case of a 23-year-old male who came as a replacement donor at blood bank, affiliated to the department of transfusion medicine in a tertiary care teaching hospital of Central India. About 350-ml whole blood was collected. On routine grouping, his blood group came out to be A positive. It was further tested with anti-A1 lectin which gave 1 + reaction. On further testing with anti-H lectin, it showed 4+reaction. The saliva inhibition studies showed the presence of A and H substances. Based on these results, it was typed as subgroup of A, an A intermediate (A_{int}) group. However, we were not able to perform molecular tests.

The A1 and A2 subgroups differ qualitatively and quantitatively, with A1 cells having $8.1–11.7 \times 10^5$ antigenic sites as compared to $2.4–2.9 \times 10^5$ antigenic sites on A2 cells.

Landsteiner and Levine were the first to recognize an additional subtype of A, which exhibited characteristics intermediate between A1 and A2, i.e., A_{int}. It is considered a heterogeneous subgroup which is more common in black people, with 13.7% of group A blacks being A_{int}.[3] The prevalence values of A1, A2, and weak subgroups in South India were reported to be 98.4%, 1.85%, and 0.01%, respectively.[4] However, there is no reported case of A_{int} in this region, and this would be the first reported case.

The expression of different A subtypes in red blood cells is the consequence of diverse formations of A substances by the action of three types of blood group transferase enzymes controlled by A1, A2, and A_{int} genes. Three different enzymes were detected when A1-, A2-, and A_{int}-type plasma was examined.[5] Thus, it is possible to determine the A subtypes by examining the kinetic characteristics of different α-*N*-acetylgalactosaminyl transferases in the plasma. Mutations in ABO alleles results in differences in the specificity and activity of transferase enzymes, leading to the addition of low levels of A immunodominant sugars to the precursor H antigen.[6] Thus, performing a molecular test or enzyme analysis would have been useful but could not be done in this case.

The importance of subtyping A blood group and identification of A_{int} has been highlighted by a recently published case reported during organ donor workup for incompatible liver transplantation in South India.[7] This could be the first reported case of A_{int} in this region. However, further studies are needed for the identification of weak A subgroups in the region.

Our report points to the need to perform molecular tests or enzyme analysis in certain cases. We also recommend that testing of all A blood groups should be mandatorily done using anti-A1 and anti-H lectin.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Minal Wasnik, Saurabh Lahare, Ramesh Kumar Chandrakar, Sankalp Sharma

Department of Transfusion Medicine and Blood Bank, All India Institute of Medical Sciences, Raipur, Chhattisgarh, India

Address for correspondence:
Dr. Minal Wasnik,
Department of Transfusion Medicine and Blood Bank, All India Institute of Medical Sciences, Raipur, Chhattisgarh, India.
E-mail: minal8681@yahoo.co.in

Submitted: 15-10-2018
Accepted: 13-03-2019
Published: 26-05-2022

References

1. Cooling L. ABO, H, and Lewis blood groups and structurally related antigens. In: Fung MK, Grossman BJ, Hillyer CD, Westhoff CM, editors. Technical Manual. 18th ed. Bethesda: AABB; 2014. p. 291-313.
2. Yoshida A, Davé V, Branch DR, Yamaguchi H, Okubo Y. An enzyme basis for blood type A intermediate status. Am J Hum Genet 1982;34:919-24.
3. Brain P. Subgroups of A in the South African Bantu. Vox Sang 1966;11:686-98.
4. Shastry S, Bhat S. Imbalance in A_2 and A_2B phenotype frequency of ABO group in South India. Blood Transfus 2010;8:267-70.
5. Yoshida A, Davè V, Hamilton HB. Imbalance of blood group A subtypes and the existence of superactive B gene in Japanese in Hiroshima and Nagasaki. Am J Hum Genet 1988;43:422-8.
6. Thakral B, Saluja K, Bajpai M, Sharma RR, Marwaha N. Importance of weak ABO subgroups. Lab Med 2005;36:32-4.
7. Sachan D. Blood group A (int) causing uncertainty during organ donor work-up for incompatible (A2-O) liver transplantation. Blood Transfus 2013;11:460-1.

Access this article online	
Website: www.ajts.org	**Quick Response Code:**
DOI: 10.4103/ajts.AJTS_126_18	

How to cite this article: Wasnik M, Lahare S, Chandrakar RK, Sharma S. A_{INT} blood group: A case report on rare subtype of blood group A. Asian J Transfus Sci 2022;16:154-5.