CASE REPORT

Bombay blood group discovered incidentally in a middle-aged female posted for hemithyroidectomy: A near miss

Archana Shetty[1], Bhargavi K. N[1], Supriya T. R[1], Aishwarya Muralidharan[2]*

[1]Department of Pathology, [2]Department of ENT, Dr. Chandramma Dayananda Sagar Institute of Medical Education and Research, Dayananda Sagar University Devarakaggalahalli Village, Harohalli, Ramanagara, District -562112 (Karnataka) India

Abstract

ABO is the most widely utilized blood group system. Bombay blood group is a rare subtype of autosomal recessive group with absence of H antigen and presence of anti-H, anti-A and anti-B antibodies. We present a case of a 51-year-old lady posted for hemithyroidectomy and incidentally detected to be of Bombay blood group when a blood unit was reserved for surgery. She was a non-secretor for H substance on saliva inhibition test. History of consanguineous marriage was present. We wish to reaffirm that ardent effort has to be undertaken to confirm all 'O' group individuals with reverse grouping during routine testing for blood groups, failing which the rare Bombay blood group can be misdiagnosed as 'O' resulting in an acute haemolytic reaction if any unit other than that of Bombay blood group is transfused. Individuals with this group need to be counselled about rarity and clinical implications of the same.

Key Words: ABO Blood-Group System, Bombay Blood Group, Para-Bombay Blood Group, Blood Transfusion.

Introduction

Bombay phenotype is a rare blood type first reported in 1952 by Dr. Y. M. Bhende in Bombay. It results due to point mutations in FUT1 (H Gene) and/or FUT2 (Secretor gene) on chromosome 19 [1]. This blood group is characterised by absence of normal ABH antigens and have corresponding anti-A, anti-B and anti-H antibodies in the serum [2]. Blood grouping in these individuals is challenging as it can be missed when only forward grouping is done as in routine practice. We wish to present a case of Bombay blood group encountered in our blood centre as a part of pre-transfusion work-up in a patient who was posted for hemi-thyroidectomy.

Case Report

A 51-year-old woman presented to the ENT out-patient department with a thyroid swelling. After work-up, a diagnosis of colloid nodule was conferred and hemi-thyroidectomy was planned. In view of anticipated intraoperative blood loss, a unit of packed Red Blood Cells (RBC) was reserved. Her files carried a blood group report of O positive done a few years ago and had no history of previous transfusions.

Immuno-hematology work-up: Blood grouping was done by gel card (Matrix Octoplus Forward and Reverse Grouping Card with Sub Grouping; Tulip Diagnostics [P] Ltd., Goa, India). Her RBCs showed no reactivity with anti-A or anti-B antisera and strong positivity with anti-D. Reverse grouping was performed to identify serum antibodies. A strong agglutination was noted with type A and B red cells as well as with inhouse prepared quality checked pooled "O" control cells. No agglutination was noted with Anti-H Lectin (Tulip Diagnostics

[P] Ltd., Goa, India) indicating absence of H antigen (Figure 1). Sample of the patient was checked for manual agglutination with Anti-H Lectin which was also negative. Weiner saliva inhibition test showed absence of A, B and H substance (Figure 2).

The saliva inhibition test showed agglutination in all 3 tubes with A, B and H antigen. Patient was reported as Bombay (Oh) group of the non- secretor phenotype (Table 1).

Blood group was conveyed to the surgeons and colloids were kept as reserve to be used as replacement fluids in case of intra-operative blood loss as no Bombay blood group was available in the near vicinity. The patient underwent a hemi-thyroidectomy with minimal blood loss. Her first degree relatives, husband and sons were tested for their blood group. Younger sister was found to be of Bombay phenotype. She had undergone hysterectomy 5 years ago, where a unit of blood was reserved assuming her group was O. However, there was no history of blood transfusion.

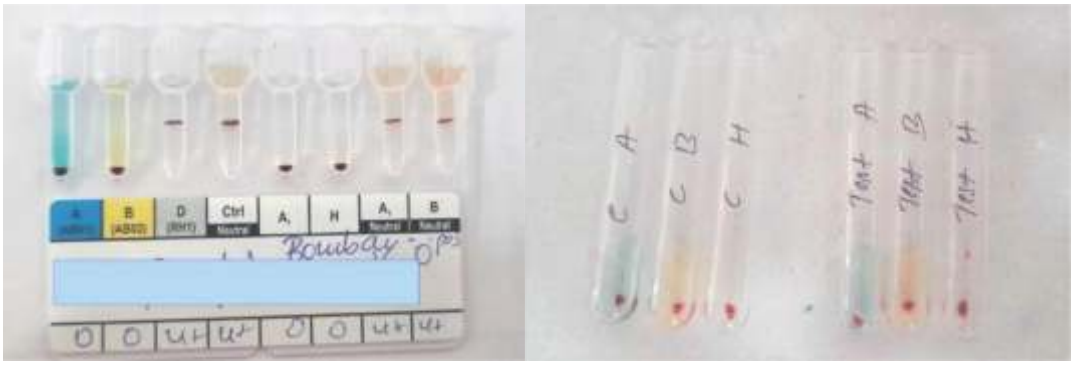

Figure 1: Gel card method forward and reverse grouping showing the Bombay group phenotype;
Figure 2: Weiner's saliva inhibition test demonstrating the absence of A, B and H antigens (Non-secretor)

Table 1: Immuno-haematology work-up –Blood grouping and saliva inhibition test

Blood Grouping (Gel card)	**Forward (cell) grouping**				**Reverse (serum) grouping**		
	Anti-A	**Anti-B**	**Anti-D**	**Anti-H**	**A cells**	**B cells**	**O cells**
	0	0	4+	0	4+	4+	4+
Saliva inhibition test	**Test**	**Control**					
	A	**B**	**H**	**A**	**B**	**H**	
	+	+	+	+	+	+	

Discussion

Individuals with Bombay blood group lack the H antigen which is also the precursor for A and B antigens. These individuals produce anti-A, anti-B and anti-H antibodies. The presence of anti-H antibody is incompatible with all blood types which carry H antigen. Therefore, they can donate to all ABO blood groups but can only accept from Bombay blood group individuals. The Bombay phenotype has a higher incidence in Indian subcontinent and parts of Middle East. Overall incidence in India is 1 in 10,000 with higher reported incidence in its southern states where consanguineous marriages are more common [3-5]. In addition to RBCs, blood group substances are also soluble antigens that can be seen in body fluids such as saliva, sweat, digestive secretions, breast milk and tears [6]. Individuals with SeSe or Sese genes who secrete blood group antigens are known as 'secretors', which constitute about 80% of the general population. Persons with sese gene ('non-secretors') constitute the remaining 20% [6]. Saliva agglutination test done in our case, showed agglutination in all 3 test tubes indicating the absence of H antigen.

Bombay blood group should be differentiated from para Bombay group, both of which are autosomal recessive [1]. Para-Bombay individuals are homozygous for a non-functional FUT1 but have at least one functional FUT2, making them secretors. H, A, and/or B antigens from secretions may occasionally get adsorbed onto the RBC surface, and thus, these individuals carry negligible amounts of the same on their RBCs [1]. Para Bombay type can be differentiated from Bombay type in that the former has A or B antigens in secretions whereas the latter does not as in our case. Laboratories must institute confirmation of all 'O' group individuals with reverse grouping [4]. Currently, many blood centres and laboratories use the slide method which can misdiagnose these rare groups as 'O'. It would be ideal for blood banks to use Gel microcolumn technique for grouping and crossmatching.

Correct identification of Bombay blood group has clinical implications. Anti-H can activate complement causing intravascular haemolysis. Shahshahani *et al*., (2013) have reported a case of Bombay group being misdiagnosed and transfused as 'O' with subsequent development of acute transfusion reaction, which could have been prevented by a thorough immuno-hematologic work-up [8]. The main challenge in these patients is extremely rare possibility of Bombay blood units being available, delay in arrangement of which could adversely affect patient outcome [9]. Any such individual who requires an urgent transfusion, can be instituted colloids and crystalloids as an alternative. For elective surgeries autologous blood transfusion, acute normovolemic haemodilution or cryopreserved units can be the other options [9]. Consanguinity is a proven risk factor in inheritance of Bombay Blood group akin to the patient in our case. Pre-marital blood phenotyping and avoidance of marriage among those carrying the 'h' allele is advised [3].

These rare group individuals should carry an identity card of their blood group and register themselves with regional donation centres [3].

Blood banks need to create a rare group registry for prompt response in wake of emergency situations where donors of this group in the vicinity could be called upon for quick arrangement of blood as prior screening procedures for transmissible diseases needs to be completed before blood is ready for use [9-10]. Screening of first degree relatives of individuals carrying Bombay blood group and maintenance of rare blood group registry can be initiated by blood centres.

Conclusion

Bombay blood group can often be missed on routine grouping as it mimics the more common group O. Performing both forward and reverse grouping is mandatory before initiating any blood transfusion to avoid misinterpretation of rare types like Bombay blood group. Complete immune-hematologic work up is recommended to categorize the H phenotype subtype.

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Author for Correspondence:
Dr. Bhargavi K.N, Department of Pathology, Dr. Chandramma Dayananda Sagar Institute of Medical Education and Research, Dayananda Sagar University Deverakaggalahalli, Harohalli, Kanakapura Road, Ramanagara District, Karnataka – 562112
Email: bhargavi.kn91@gmail.com Cell: 919035371135

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