

## Case Report

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# Rarest of rare bombay blood group in bangladesh: a case report

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### Summary:

*A 35 years old lady was admitted to Square Hospital for termination of pregnancy on a medico-legal background. She was a diagnosed case of carcinoma of pancreas with Whipple's operation performed six months back and was on chemotherapy. During pre-operative check-up we surprisingly noticed that she has 'Bombay Blood Group'. It is a very rare type of blood group and on routine blood grouping behaves as "O" unless reverse grouping or serum grouping has been done and can receive transfusion from only peoples having Bombay group. As the patients general condition was poor and had recently received chemotherapy and also had a extremely rare blood group (I in 250000) we decided to keep ready one unit of blood. We decided to provide autologous blood transfusion, as there was no known person in family or in our blood banks record with Bombay Blood Group. The procedure was uneventful and needed no transfusion. As the patient was anaemic and weak, we decided to transfuse the blood in the post-operative period and the patient was discharged from the hospital next day morning.*

**Key words:** *Bombay blood group, autologous blood transfusion.*

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### Introduction:

Bombay blood group comprises an immunologically distinct<sup>1</sup>, genetically determined group of human erythrocytes characterized by lack of A, B and H antigens but having antibodies in the serum against all the above three antigens. It is called Bombay Blood Group; it was first discovered in Bombay, now known as Mumbai, by Dr. Y M Bhende in 1952<sup>1</sup>. This group is a rare exception to the commonly accepted ABO blood types. It is observed to occur 1 out of every 250,000 people in the world except in parts of India (Orissa) where the incidence has been observed to be as much as 1 in 7600<sup>2</sup>. People who have Bombay blood group can not donate blood to any member of the ABO group, they can not receive blood from any member of the ABO blood group. They can only receive blood other people who have Bombay phenotype. This group is commonly mistaken as O group and many times not identified at all because of lack of necessary technology in blood banks. Bombay blood

group differs from O group by lacking H antigen on RBC and could be Rh positive or negative<sup>3</sup>. If a Bombay blood group recipient is transfused with the blood other than Bombay, it can lead to a severe haemolytic transfusion reaction, which can be fatal and even lead to death<sup>4</sup>. Given that this condition is very rare, any person with this blood group who needs an urgent blood transfusion will probably be unable to get it, as no blood bank would have any in stock. Those anticipating the need for blood transfusion (e.g. in scheduled surgery) may stock their blood for their own use (i.e. an autologous blood transfusion)<sup>1</sup>.

### Case report:

A 32 years old lady was admitted at hospital for termination of 7wks of pregnancy on medicolegal ground. The patient had developed periampullary carcinoma of the pancreas and she went to Christian Medical College (CMC) at Vellore, where whipple's pancrea-ticoduodenectomy was done

followed by chemotherapy. She had taken six cycle of chemotherapy at a regular interval and the last dose was taken 4 weeks before her pregnancy. She has three children. During routine pre-anaesthetic check up, to our surprise we found that she is a patient with Bombay Blood Group. This was our first case with this rare blood group in Square hospital and a few more cases have been identified in Bangladesh. At CMC Vellore the patient was first detected as Bombay Blood Group. So two units of whole blood were collected from her at two weeks interval which were given during the whipple's operation. After finishing the last cycle of chemotherapy the patient became pregnant within one month. So the patient was advised for termination of pregnancy. Due to the rarity of the blood group and post chronic illness poor general condition we decided to keep one unit of blood ready and took it from the patient for autologous blood transfusion.

During preoperative visit her vital sign and investigation were, BP-110\65mm of Hg., pulse-96 beats \min Hb-11.6%, TC- 7.5-K/micro lit, platelet count -237 lacks. X-ray chest- NAD, ECG -NAD Test for liver function was normal. Patient was very weak and her general condition was poor.

Anaesthesia was induced with propofol and fentanyl and maintained with nitrous oxide, oxygen and isoflurane. The procedure was uneventful and blood loss was minimal. As the patient was very weak the whole blood was re-transfused during postoperative period. The patient was discharged on the next day morning with good vital sign.

#### Discussion:

There are four blood groups in the ABO system - A, B, AB, and O, and classification is based on the presence or absence of antigenic substance that appear on the surface of red blood cells. Both parents contribute to a child's blood type and the alleles that contribute to this are O, A and B<sup>5</sup>.

However, there are rare instances when a couple produces a type O child even if they don't possess any allele. If this situation occurs, the child possibly carries Bombay Blood Group in which absence of H antigen on the red blood cell surfaces. The H antigen is located on the surface of red blood cells and is the precursor of A and B antigen. The A allele is needed to produce a transferase enzyme to

modify the H antigen into A antigen. Likewise, the B allele is needed to make the transferase enzyme that would transform the H antigen into B antigen. For type O individuals, the H antigen cannot be transformed further because no H glycosyl transferase (FUT1) is produced to modify the antigen.

A person of the Bombay Blood Group inherited the recessive form of the allele for the H antigen from each of his parents. He carries the homozygous recessive (hh) genotype instead of the homozygous dominant (HH) or heterozygous (Hh) genotypes of the ABO blood group. As a result the H antigen is not expressed in the red blood cell surface; consequently; the A and B antigens are not formed. The h allele is a result of the mutation of the H gene (FUT1) that would express the H antigen in the red blood cells of ABO blood group<sup>6,7</sup>.

People of the Bombay Blood Group produce antibodies against H, A, and B antigens to protect themselves. Since they have antibodies against H, A and B antigens, they can only receive blood donations from other people with Bombay Blood Group. Receiving blood transfusions from the ABO blood group can be fatal. The antibodies of the Bombay Blood group react with the red blood cells of the donor causing cell destruction. In the past many patients who were classified as type O by the ABO test died because doctors failed to test them for the Bombay blood type.

#### Conclusion:

Bombay phenotype is a rarest of rare blood group in the world but its frequency is relatively high in India especially on its eastern part (Orissa) and tribal areas where lot of marriages do occur amongst near relatives.

Generally there is no hindrance to normal living with Bombay blood group except when they need blood transfusion. For elective cases autologous transfusion is a good proposition, as in such cases we can plan ahead and collect blood from the patient herself well ahead of the operation. But in case of emergency it is a difficult proposition altogether. It will be very difficult to find Bombay blood group at ready stock in any blood bank. Blood bank can maintain a rare blood type donor file and develop exchange programs in times of need amongst themselves. Facilities for cryo-preservation can also be beneficial for rare blood groups.

If proper blood grouping or testing practices are not followed it can lead to people with Bombay blood group not being detected. This group would be categorized as the “O” group because it would not show any reaction to anti-A and anti-B antibodies just like a normal “O” group. When cross matching with “O” group is done, then it would show cross reactivity or incompatibility. Therefore reverse grouping or serum grouping has to be performed to detect this group and thereby avoid fatal transfusion reaction.

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