



Transfusion of Incompatible ABO Blood Types

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ABSTRACT

Different blood types cannot be transfused with one another due to the difference in the specific antibodies in the plasma. This difference results in transfusion reactions and severe anaemia during incompatible blood transfusion errors. The patient will require an anticoagulant which will be the first step in the procedure, heparin, a natural anti-coagulant is used at 25 units/kg.

INTRODUCTION

The blood is now collected and passed through a centrifuge-based platform such as the cobe spectra and many more, this ensures the plasma of the blood is separated and undergoes plasmapheresis [1]. The specific-antigens are removed in this procedure and the plasma is sent again through a device that passes the blood through immunoadsorption to further reduce the concentration of antibodies in the blood [2].

This can make sure the patient does not become anaemic due to infections or heavy blood loss (in case of trauma) in the process of waiting for a blood donor in rare cases such as the Rh-null. This procedure can be carried out regardless of ABO incompatibility by suppressing the immune response [3]. Therefore, an O-ve recipient can receive blood from an A+ve donor, which is a fairly more common blood type.

DESCRIPTION

Every human being is always born with a fixed type of antigens and antibodies in their blood which determine their blood group as they age. This is purely the reason why every hospital has a blood bank with each individual blood type separately packed with anticoagulants [4]. Some blood types are rarer than the others and in fact, the Rh-null is called the golden blood for it is documented to be found only in 40 people worldwide. When such people encounter severe trauma to their bodies and

in turn lose a lot of blood, it could be life threatening, not because of the trauma, but the inability to find a blood donor. We could sustain the patient's body by passing the blood through a machine in which it undergoes plasmapheresis to separate the plasma from the Red Blood Cells (RBCs) and pass the plasma through a process called immunoadsorption, which is proven to remove specific antibodies by binding them to specific proteins and ultimately, removing them from the blood [5]. This could ensure that the newly transfused blood does not have a haemolytic-transfusion reaction. By doing this, the patient has more time to wait for a perfect donor before he becomes anaemic and his organs start to take damage. When immunoadsorption is not an option, the patient's RBCs can be separated from the plasma and recombined with an AB group blood plasma which has no antibodies naturally. By doing so, we gradually reduce the concentration of the antibodies in the blood by following the procedure on 525 ml (1 pint) of blood per cycle. This has to be carried on for 9 cycles at the least to ensure the maximum of antibodies are removed from the plasma of the blood [6].

First and foremost, the patient will be injected with heparin, 25 units/kg through a IV after which the blood would need to be drawn from the patient. This collected blood would have to be sent to a centrifuge for the first stage of the process.

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Plasmapheresis

The collected blood is centrifuged to separate the plasma from the RBCs, this plasma is treated by removing the antibodies IgG and IgM *i.e.*, anti-A and anti-B antibodies. In some cases, the plasma can also be replaced with a AB group plasma since the AB group does not contain any antibodies naturally. This would help mitigate hemolytic-transfusion reactions [7]. This plasma can also be replaced with an alternative solution such as saline or albumin. According to a paper by Trung C. Nguyen, M.D, Joseph E. Kiss, M.D, Jordana R. Goldman, M.D and Joseph A. Carcillo, M.D in the article “the role of plasmapheresis in critical illness”, this procedure has proven to be successful in ABO incompatible organ donations.

Immunoabsorption

The collected plasma is then passed into cellulose beads of an immune absorbent for the anti-A and anti-B antibodies in the blood for the complete removal of the specific antibodies from the blood. This procedure is proven to be successful in doing the following according to a paper published by W I Bensinger, C D Buckner, R A Clift titled “whole blood immune adsorption of anti-A or anti-B antibodies” [8].

CONCLUSION

This procedure has been proven by many other doctors as an efficient method for the removal of antibodies from the blood. This can replace the need of a rare blood donor immediately as the patient's body would be able to sustain on the conditioned plasma and reduce fatalities. The patient however would have to be under a regular dose of immune suppressants to make sure

there are no complications until the recipient receives the required blood type and will have to be closely monitored. This procedure can also be adopted while performing surgeries on patients who have suffered severe trauma instead of using units of rare blood which could be later transfused to the patient post-op.

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