Society for Heart Failure and Transplantation

SOCIETY FOR HEART FAILURE AND TRANSPLANTATION'S

THE REVIVAL

Promoting Academics to Improve Clinical Outcomes.

ISSUE : 3 | APRIL, 2021

Society Reg.No.: EKM/TC/186/2013, **Society secretariat:** Address 36/117, 2nd Floor, Lisie Hospital Road, Kottecanal Junction, Kochi 682018.
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EDITOR'S NOTE

Dr. Manoj Durairaj

Heart Transplant Surgeon, MS, MCh. (AIIMS, New Delhi), FACC.

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Dear Colleagues,

The Revival 3rd edition comes out in midst of the raging SARS COVID 19 pandemic. We are witnessing unprecedent events and a global tragedy. The new mutant variant of the virus is more transmissible, affecting younger population and having an insidious onset but a malignant course thereafter. Many of us have lost near and dear ones and many frontline health workers and allied service personal have laid down their lives in the call of duty. The Editorial Team salutes all these brave hearts and wishes its members a safe few months ahead. My only message to all our dear readers is - let's all "STRIVE to SURVIVE" this pandemic. Stay safe.

Dr Mukesh Goel is our guest author for this 3rd edition and he has shared his recent experience of performing India's first paediatric ABO incompatible heart transplant. The paediatric subset awaiting heart transplants have a disproportionately high wait list mortality due to paucity of appropriately sized and blood group matched donors. This successful case report of Dr Goel opens a vista of opportunities for paediatric heart transplantation in India.

- Dr. Manoj Durairaj
Editor "The Revival"

SUB EDITOR

Dr. Talha Meeran

MBBS, MD, FACC, Consultant Cardiologist, Dept of Advanced Cardiac Sciences and Cardiac Transplant, Sir HN Reliance Foundation Hospital, Mumbai.

Dear Colleagues,

Pediatric cardiac transplantation is a challenge mainly due to a shortage of appropriate body size-matched and ABO blood type-matched cadaveric donors for such recipients. Currently in India, adult ABO in-compatible kidney and liver transplants are steadily increasing. However, there are no reported successful ABO incompatible cardiac transplants in India. ABO-incompatible pediatric cardiac transplant was developed in the mid 1990s by Dr Lori West and his team in Canada.

In this edition of " THE REVIVAL", Dr Mukesh Goel takes us through a fascinating case of end-stage pediatric heart failure which was rescued with an ABO-incompatible cardiac transplant. This medical and surgical feat is commendable and hopefully shows the way for other Indian transplant programs to emulate and improve upon in the coming years.

Sincerely,

Dr. Talha Meeran
Sub Editor "The Revival"

PRESIDENTIAL MESSAGE

Prof. (Dr) V. Nandakumar

Director & Chief, Division of Cardio Vascular/Thoracic Surgery & Cardiac Transplantation, Metromed International Cardiac Centre, Calicut, Kerala.

Dear Colleagues,

Greetings from the Society for Heart Failure and Transplantation.

The 3rd issue of the official News letter of SfHFT " The Revival" is ready for circulation now. In this issue, problems involved in ABO incompatible heart transplantation are discussed. Most dreadful complication of ABO incompatibility in transplantation is the hyperacute rejection which as mentioned in this article is less in children during the first few months of life.This advantage can be utilized for transplantation in young infants with great success.

I am sure this article will be thought provoking and will give a new ray of hope to infants needing heart transplantation even when ABO group compatible heart is not available.

- Prof. (Dr) V. Nandakumar
President

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Special thanks to
Dr. Mukesh Goel for authoring this month's article.

Designed by Maithili Kulkarni

ABO INCOMPATIBLE HEART TRANSPLANT IN A YOUNG INFANT

Dr. Mukesh Goel

Senior Consultant, Cardiothoracic Surgery Heart & Lung Transplant Indraprastha Apollo Hospital, New Delhi

Dr Mukesh Goel completed MCh in CTVS from GB Pant hospital, New Delhi in 2001. He joined Escorts Heart Institute and got trained in beating heart CABG. He is presently associated with Indraprastha Apollo Hospital, New Delhi as Senior Consultant Cardiac Surgeon.

He is credited with carrying out the first heart transplant at Apollo Hospital, New Delhi. He is the coordinator of Heart & Lung Transplant & ECMO at the Institute.

His interest include CABG, aortic surgery, MICS MVR, LVAD, ECMO, Heart & Lung transplantation.

ABO incompatible heart transplant is contraindicated due to very high risk of hyper acute rejection due to preformed anti A/anti B blood group antibodies. Children needing heart transplant have very high waiting list mortality due to paucity of suitable organs. Children with O blood group have disproportionately high competition for organs while organs from those with less common groups like B and AB go waste. Complement system is not fully developed in newborn infants and they don't produce isohaemagglutinins with absent or very low anti A/B titers. Thus, the factors for acute rejection are not present in infants and small children and this fact is useful for ABO incompatible pediatric heart transplant. We present one ABO incompatible heart transplant in five-month-old boy.

A four month old boy was transferred on ventilator and inotropes from UAE . Child was in cardiogenic shock with no recordable pulse and blood pressure. Child was resuscitated with fluid, inotropes and diuretics. He was put on broad spectrum antibiotics. Child stabilized in next forty eight hours and became alert with warm peripheries and adequate urine output. He had already developed gangrene of right hand and foot with ischemic changes in tip of left fingers and toes. His Echo showed non compacted left ventricle with significant dilatation and severely depressed ejection fraction (15%). He also had severe mitral regurgitation (MR) contributing to low cardiac output and pulmonary edema. His chest xray had picture of pulmonary edema and areas of consolidation in right lung. He was treated with inotropes and ventilation twice in last three months in UAE.

Initial plan was to implant biventricular assist device (Berlin heart) and to wait for the donor heart. However, presence of limb gangrene and lung consolidation made us to decide against BiVAD. A decision was taken to do " Pulmonary artery banding" to increase right ventricular afterload and shift interventricular septum to left to influence severity of MR and pulmonary congestion. PA Banding was carried out two weeks after arrival. Tracheostomy was also done to prepare for long ventilator support. His MR came down quite a bit in postoperative period, pulmonary edema improved and inotropes and diuretic requirement came down. He got stabilized but remained dependent upon Mirinone and Lasix infusion. His ventilator requirement also came down to minimal support with periods of spontaneous respiration. We were, however, not able to wean him off inotropes, diuretics and ventilaory support completely. His PRA was nil.

One month after his arrival, information was received about a twenty-month-old girl child with brain death consequent upon traumatic brain injury. Her blood group was AB while that of our child was O. We decided to accept the AB group heart for O group child keeping in mind the rarity of pediatric donors, uncertainty of availability of size and group matched organ, doubtful survival of child during waiting period and immature immune organs in children. Anti A & B titers of the child were done which were 1:1 for both meaning no antibodies against A & B antigens were detected. Blood products were arranged to eliminate anti A/ B antibodies in plasma and platelets (AB plasma and platelets) while red cells were of O group. Rituximab (monoclonal antibody) was administered in a dose of 375mg/m2 before induction.


Image by fujikama from Pixabay

The rest of the immunosuppression was what is routinely used including Tacrolimus, Mycophenolate, and methyl prednisolone/prednisolone. Cold ischaemia time was 140 minutes. Transplanted heart regained normal rhythm and contraction after reperfusion and was weaned off cardio-pulmonary bypass with milrinone and dobutamine. Inotropes were weaned off in next four days. He was on spontaneous respiration with intermittent ventilaor support after five days of transplant mainly because of pre-existing right lung consolidation.

Anti A & B titers were measured daily for initial five days and alternate days subsequently. These have remained 1:1. CD 19 levels to monitor Rituximab were measured after ten days of first dose and were nil.

Heart transplant is well established as effective therapy in children with end stage heart failure. Post transplant five years survival is close to 80% in experienced centers. However, concern of hyperacute rejection in ABO incompatible transplant hampers efficient utilization of organs in paediatric group and also causes high wait-list mortality. In children, antibodies against carbohydrate blood group antigens start developing by age of six to eight months after colonization of gut by E.Coli by that age which has cross reacting antigens at its surface. This fact can be utilized for ABO incompatible transplant in young children with similar results to those with ABO incompatible transplant. Lori J West et al described ten children with ABO incompatible transplant who had similar survival and suffered no more rejection episodes compared to children with ABO compatible transplant. Partial B cell tolerance may be a factor in preventing future development of antibodies against donor blood group antigens.

The results of ABO incompatible transplant in children are at par with that of ABO compatible transplant. One should not shy away from ABO incompatible transplant in young children, as wait-list mortality is very high otherwise.

SALIENT POINTS:

1. Children requiring heart transplant have disproportionately high wait-list mortality due to paucity of size and blood group matched donors.
2. Immune system and blood group antibodies responsible for hyperacute and acute rejection is not fully developed in children.
3. ABO incompatible heart transplant can safely be done and has comparable results to that of ABO compatible transplant.
4. The need of special immune suppression techniques is rare .
5. B cell tolerance (accommodation) develops against donor antigens later on.

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