

Overcoming Medical Barriers in Living Donor Kidney Transplantation



The National University Hospital (NUH) in Singapore made news in October 2009 when its multidisciplinary team overcame two major obstacles to offer a new lease of life to Mrs Daisy Thung, who has been on dialysis for the last nine years.

Professor A. Vathsala, Director, Adult Renal Transplant Programme and Dr David Consigliere, Head, Department of Urology, University Surgical Cluster (USC), NUH share Daisy's story of survival.

An Uncommon Case

For nine years, Mrs Daisy Thung struggled with kidney failure. Though only 35 years old, her life was already hanging by a thread - she was down to her last blood vessel for dialysis and a kidney transplant was her only hope. Her renal physician had over the last few years explored all other possible options, but to no avail. Finally, the option of an ABO-incompatible transplant was later presented to Daisy, and Prof Vathsala at the NUH was subsequently approached to collaborate in the transplant.

Although Daisy's husband, Mr Thung T.K. was a willing and available donor, she faced two medical hurdles - firstly, her blood group is incompatible with her husband's (a condition also known as ABO Incompatibility); secondly, she is also cross-match positive, meaning she has antibodies against her husband's tissue antigens [2] (i.e. anti-HLA antibodies).

Traditionally, transplants across ABO-incompatible blood groups are doomed for failure, and more so in cross-match positive patients. Nonetheless, techniques using plasma exchange and immunosuppression developed in the last decade have largely helped to overcome the latter difficulty.

The Risks

A transplanted kidney is usually placed in the lower abdomen and the donor's blood vessels (artery & vein) sewn individually to the recipient's iliac artery and vein. The donor's urine tube (ureter) also has to be sewn to the recipient's bladder to convey the urine into it. As Daisy had practically almost "run out of blood vessels", Mr. Thung's donated kidney had to be placed in her left lower abdomen and one challenge was to make sure that the blood vessels could be sewn together without any complications.

Another challenge was the fact that Daisy had to undergo the operation just when the antibody titers against her husband were at the lowest possible level. This meant the surgeons and anaesthetists had to prepare several operative slots for Daisy's operation. More importantly, this meant she needed to be operated on immediately after an immunoabsorption or plasma

exchange procedure, at which time her blood might not be able to clot properly. This potentially increased the risk of bleeding during and after the operation, which could have had disastrous consequences. Meticulous attention to even tiny bleeding vessels had to be given during the operation to prevent bleeding.

The surgeons also had to monitor for an instant rejection of the donated kidney because of the positive cross-match and blood group incompatibility states. If this were to happen, the donor kidney would have suddenly become very swollen, with no blood flowing through the vessels. The whole organ would have turned "black & blue". The kidney would then have had to be removed and the operation deemed to have failed.

Finally, a technical difficulty was the discrepancy in kidney size - Daisy is rather petite patient and Mr. Thung's kidney was considered large for her size. Careful ensuring that positioning the kidney inside Daisy was important to prevent kinking of the blood supply and clotting of the vessels.

Saving Daisy

Despite the risks, both Daisy and her husband agreed to proceed with the transplant. To prepare for it, the team of doctors and surgeons from various departments and divisions at NUH worked closely to plan the complex procedures involved. Immunoabsorption columns from Sweden were also flown in - these were devices that helped remove the blood group antibodies to a sufficiently safe level for Daisy to be operated on.

To overcome the problem of a positive cross-match, Daisy also received immunosuppression and underwent plasma exchanges, during which plasma containing anti-HLA antibodies is removed and replaced with antibody-free ones.

Meanwhile, the Health Sciences Authority (HSA) Blood Services Group provided specialised laboratory testing and professional advice in the areas of immuno-haematology and tissue typing. HSA also assisted with preparing blood products containing little, if any anti-HLA and blood group antibodies, for transfusion

Post Transplant

Daisy's transplant eventually took place on 17 September 2009. After the surgery, her kidney functioned immediately and has had no rejection since. She now has completely normal kidney function and is now free from dialysis. Her husband was discharged on the fourth post-operative day and is also doing well.

"This is a challenging case in every sense but it was also most rewarding. Daisy and her husband are a living testimony that no barriers are insurmountable. Their story is not one about survival of the fittest. Daisy's miracle was made possible because of the couple's perseverance, courage, love for and trust in each other." Prof A. Vathsala.