Editorial

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Heart Transplant

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Editorial

Since the first heart transplant was performed in 1967, heart transplantation has grown worldwide. The most recent 33rd adult heart transplant 2016 report encompasses over 118,788 heart transplants in recipients of all ages [1-3]. There are currently 457 heart transplant centers worldwide, and 177 heart lung transplant centers reported. ISHLT registry data collection represents approximately 66% of the worldwide thoracic transplant activity.

The underlying diagnosis of heart failure leading to heart transplant in adults had been predominantly due to ischemic and non-ischemic cardiomyopathy, but centers have seen a rise in primary transplant with congenital heart disease, hypertrophic cardiomyopathy, restrictive cardiomyopathy, valvular cardiomyopathy, re-transplantation, and other diseases [4-6].

Intensive multidisciplinary and collaborative evaluations addressing selection criteria are occurring at all centers based on guidelines updated in 2016 [7]. Patient survival remains excellent with 1 year at 90%. This far exceeds comparable diseases with life ending prognosis at less than one year. Long-term survival is slowly improving and should be a major focus of intervention specifically with coronary vasculopathy, progressive renal insufficiency, and post-transplant comorbidities impacting long-term survival, most of the diseases occurring at 5-15 years post-transplant [1].

The use of mechanical circulatory support with extracorporeal membrane oxygenation, left and right ventricular assist device, and total artificial hearts have all helped to stabilize critically ill patients and offer some level of rehabilitation while waiting for a donor organ as a bridge to transplantation. Since 2007, the number of patients needing some level of mechanical support has grown from 27% to as high as 70% in many programs. Expanding donor pool criteria and donor management by transplant centers has helped to utilize organs that traditionally would not have been used including utilizing the Public Health Service consent process to consider donors with drug usage and hepatitis C, and use of HIV organs is currently under discussion and limited practice. With the clinical advent of the Organ Care System (OCS) [2,3] perfusion pump allowing marginal hearts on pump to be evaluated for usage and extending travel opportunities for critically ill patients where distance and ischemia time would preclude transplantation for many centers, this is allowing assessment and recovery time for heart function before implant.

Intensifying clinical research efforts to identify noninvasive and reliable biomarkers for screening of heart transplant rejection is one of the major challenges in cardiac transplantation. Precision medicine utilizing clinical translational medicine continues to assess biomarkers and assays for diagnosis of rejection and graft injury. The integration of bioinformatics and dataset integration is happening at many levels in translational research centers throughout the world. Attempts at understanding, as well as designing, a strategy to prospectively manage transplant patients using these biomarkers to preserve organ function in a less invasive manner is advancing. The identification of genomic predictors through collaborative translational research centers in the cardiac transplant area is proving to be very beneficial in the day-to-day monitoring by using BNP technology as well Gene Expression Profiling [4] and Cell Free Donor-derived DNA (cfdDna) [5] peripheral blood testing at the clinical level. The continued indication and need for endomyocardial biopsies is important but fraught with potential serious complications in 3-10% of patients. The discovery of Micro RNAs [6], as noninvasive biomarker, are known to be involved many biological processes such as development cell proliferation, apoptosis and oncogenesis. There is emerging data suggested that they may play a critical role in the regulation of immune cell development and in the modulation of innate and adaptive immune responses. This is an exciting interest in the field of solid organ transplant. Consequently miRNAs may well be useful and relevant as non-invasive biomarkers for heart transplant rejection and guide the clinical management of heart recipients.

The field of cardiac transplantation continues to evolve with many expanding patient indications resulting in selection criteria challenges particularly in light of donor organ availability. Efforts to identify and expand organ usage as well as the management in time commitment from OPO's and transplant centers are helping to recover more organs. First year survival with virtual crossmatch, as well as new Luminex Antibody technology, has been very helpful in reducing acute early cardiac rejection. The one-year survival may not change greatly particularly at high volume centers who take on very complex patients at extremely

high level of illness or high antibody levels. One of the many challenges in the field of solid organ transplantation is to manage and support long-term survival by expanding medical, therapeutic, physiologic diagnostic testing.

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