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A successful strategy for achieving minimal cold ischemia time for Donation after Circulatory Death in Belfast City Hospital

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Abstract

Belfast is the sole renal transplant centre in Northern Ireland (population 1.8 million) and the local Histocompatibility & Immunogenetics laboratory supports approximately 120 transplants annually. Donation after Circulatory Death (DCD) donor organs have been used in this centre since 2013. Such transplants have outcomes comparable to donation after brainstem death donor transplants provided the Cold Ischaemic Time (CIT) is minimised. United Kingdom guidelines suggest the CIT should be ≤12 hours. In this brief communication the strategy employed to achieve low CIT and the outcomes for the year 2015-16 are discussed.

Keywords: Donation after circulatory death; Northern Ireland; Renal transplant; Cold ischemia time

Introduction

Belfast is the sole renal transplant centre in Northern Ireland (population 1.8 million) and the local Histocompatibility & Immunogenetics laboratory supports approximately 120 transplants annually. Donation after Circulatory Death (DCD) donor organs have been used in this centre since 2013. Such transplants have outcomes comparable to Donation after Brainstem death Donor (DBD) transplants provided the Cold Ischaemic Time (CIT) is minimised. United Kingdom guidelines suggest the CIT for renal transplants should be ≤12 hours [1]. There has been a significant increase in DCD in Northern Ireland since the year of commencement four years back with excellent outcome.

Material and Methods

Samples from 35 local potential DCD donors were received in the Northern Ireland Regional Tissue-typing laboratory for HLA typing. Eighteen were subsequently 'stood down' and in two instances both kidneys were exported to mainland UK leaving 15 that were used locally. In five cases both kidneys were transplanted locally, resulting in a total of 20 transplants. HLA typing for HLA -A,-B, -C, -DRB1, -DRB345, -DQB1 and -DPB1 loci was performed at low- intermediate resolution in duplicate on samples from all 35 potential donors by Luminex reverse Sequence Specific Oligonucleotide probes (r-SSO) using kits from One Lambda (USA).The Complement Dependent Cytotoxicity

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(CDC) B and T cell crossmatch procedure was amended in that peripheral blood, received at the time of sampling for typing, was used instead of waiting for retrieval of spleen cells. CDC crossmatch was commenced immediately after a suitable recipient was identified, using cells extracted from donor peripheral blood and the latest serum sample available from the potential recipient. Virtual crossmatching was considered suitable for three recipients and CDC crossmatching was performed for the 17 remaining prospective recipients.

Results

Eighteen donors were stood down during this process. HLA typing results of the remainder were submitted electronically to Organ Donation and Transplantation (ODT) Authority UK, who produced a list of potential recipients. Allele mismatches varied from 2-7 (mean 5.7) on considering mismatches at HLA–A*, -B*,-C*, -DRB1*, -DRB3,4,5*, -DQB1*and -DPB1* loci. Mean age of recipients and donors was 58.6 and 48.8 years respectively. The mean CIT was 8.4 hours (range 4.4 – 18.1). This is substantially better than that achieved in any other UK transplant centre [Figure 1]. The number of DCD performed in Belfast and United Kingdom from 2013 -2016 is depicted in Table 1 -which clearly illustrates the sharp proportionate increase in DCD in Northern Ireland as compared to the rest of UK.

Discussion

The routine use of cells extracted from peripheral blood instead of waiting for retrieval of the spleen for crossmatching, facilitated a significant reduction in cold ischaemia time in this sub - optimal group of donors. Frequently crossmatch was reported before withdrawal of life support thus allowing timely transplantation. Both the short and long-term outcomes from DCD donors including expanded criteria DCD in UK has been shown to be similar to that renal transplants from DBD [2]. Incidence of delayed graft function comes down significantly with reduction of CIT to less than 12 hours [3,4].

Other centres may proceed to surgery in a similar manner by restricting DCD transplants to recipients suitable for virtual crossmatching only. The number of DCD in UK has increased rapidly from 200 donors in 2007 -08 to 584 in 2016-17 representing 41% of the donations in 2016-17. The disadvantage of this strategy is the additional work entailed in the laboratory, as only 50% of potential DCD donors proceeded to a renal transplant. The Belfast method allows equity of access to DCD organs to all on the waiting list. In the last three years there has been a rapid increase in the number of DCD performed at this centre. The centre has registered a sharp increase in number of DCD at the centre from none in 2013 to 21 in 2016.

Figures

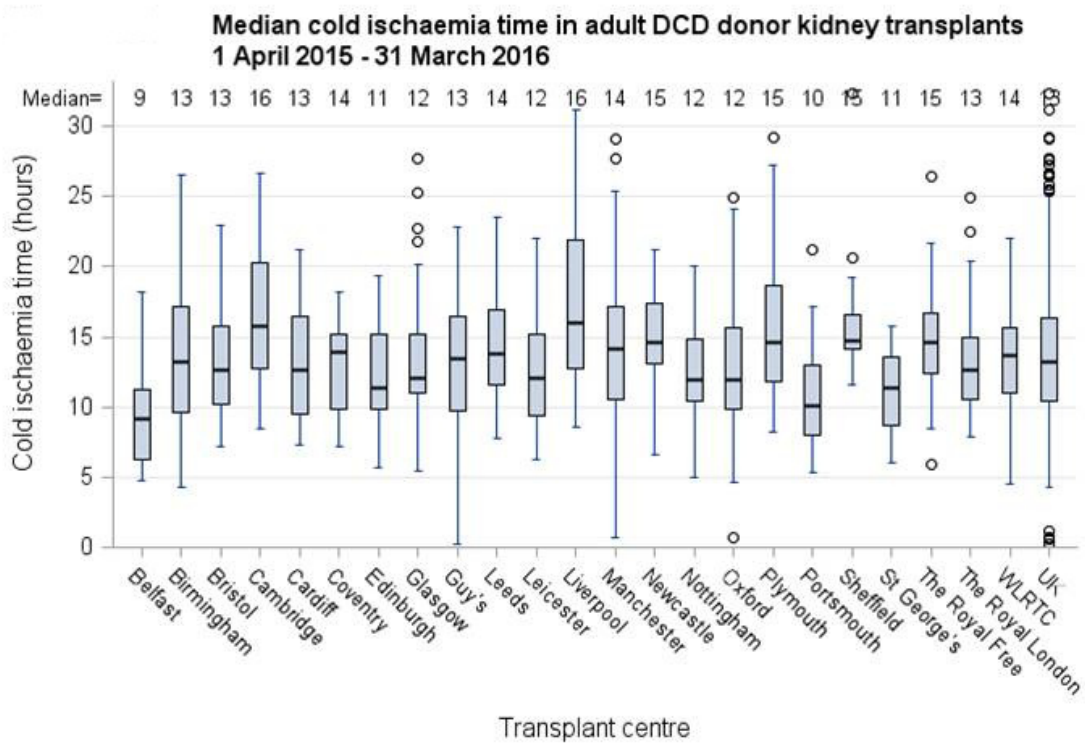

Figure 1: Showing the Cold Ischaemia time for DCD donors in UK.
The X – axis shows names of various Transplant centres in United Kingdom; Y axis shows median Cold Ischaemia time in hours with each square representing 5 hours. The numerals in the upper panel of the Figure shows the numerical value of the cold ischemia time for each centre.

Source - NHSBT Annual report on kidney transplantation 2015/2016

http://www.odt.nhs.uk/pdf/organ_specific_report_kidney_2016.pdf

Tables

Table 1: Number of DCD performed in UK and Belfast between 2013 -2016 and Percentage change as compared to previous year.

Year	DCD in UK	DCD in Belfast	Percentage change UK/ Belfast
2013	507	0	-
2014	540	2	+ 6.5 / -
2015	510	11	-5.5 / +450
2016	579	21	+13.5 / +90.1

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