Lung transplantation from donation after cardiocirculatory death: the end of the golden era?

John H. Dark*

Organ donation after cardiac, or more correctly cardiocirculatory, determination of death (DCD), occupies an anomalous position. In some countries, such as Germany, it remains virtually unknown, but in the UK, in contrast, it provided 41% of deceased organ donors in 2014 [1]. In a number of Western European countries—Belgium, Netherlands, the UK [2]—and in Australia and Canada, but to a much lesser extent in the USA, lung transplant from such donors has come to comprise a significant proportion of all activity.

In general, the results have been excellent. Except for one early, single institution publication [3], all the reports show a striking similarity in early survival between transplants from (donation after cardiac death) DCD or DBD donors. Examples of virtually superimposed survival curves are to be found in papers from centres as diverse as Melbourne [4] and Groningen [5]. While there must be an element of publication bias (one might not submit inferior results) the similarity of early survival from around the world is striking.

There are many reasons to expect similar results. The donor lung is not subjected to the rigours of brain stem death and may have less inflammatory activation. The lung has been considered the ideal organ to retrieve from DCD donor [6].

The same is seen in a landmark study from Hare End [7], but theirs is almost the first to examine the medium and longer period (up to 7 years) after transplant. They are the first to suggest, in any serious way, that these lungs are not as good as the standard, from DBD. The report details a divergence in survival, and in freedom from bronchiolitis obliterans syndrome (BOS), the manifestation of irreversible chronic rejection in the lung.

The report comes from an institution with a very respectable activity in lung transplantations, more than 300, in a 5-year period, and a positive approach to DCD lung donation—they comprised ~20% of the total. So the results have to be taken seriously, but at the moment stand alone; the Australian experience had no difference in survival (but did not examine BOS) out to 4 years. In

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Leuven, both BOS and survival were the same out to 3 years, but the numbers (21 patients) were small enough for a difference not to have been detected [8].

There are a number of reasons why BOS (the major determinant of medium and late survival) might be more common after DCD donation. In the donor, while lung inflation protects the lung parenchyma from ischaemic damage, its effect on the airway, usually perfused from the systemic circulation, is unknown. The possibility of a link between airway ischaemia and BOS is increasingly recognized [9].

Another parallel comes from the liver, where ischaemic cholangiopathy is a significant and dreaded complication when retrieval is from a DCD donor—it is almost unknown in DBD livers. There are obvious analogies between the epithelial biliary tree and its equivalent in the lung.

In this series, there was a measurably higher incidence of primary graft dysfunction, which is itself a risk factor for BOS. A possible cause for this might be a longer agonal phase, as suggested in one early series [10]—we do not have that information from the Harefield group.

What is the next step? For the moment, the consensus must remain that these lungs, from DCD donors, are as good as those from DBD donors. But all those in the field must examine their medium term survival, and incidence of BOS, preferably in Registries with sufficient numbers to avoid a type II statistical error. If a similar difference is found, the risk factors for early BOS must be investigated. Is it related to particular donor factors, such as prolonged agonal phase, or extended warm ischaemia? The lung transplant community cannot afford to turn its back on this huge and invaluable source of donor organs.

REFERENCES


