LETTER TO THE EDITORS

Controlled donation after circulatory death in France: first results of a nonuniversity pilot centre

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Dear editors,

France started its national controlled donation after circulatory death (cDCD) programme in December 2014. We present the first 2-year results of the first pilot centre authorized. All deceased patients in our 16-bed intensive care unit (ICU) were prospectively enrolled into a national database transplant information system run by the Agence de la biomedicine (ABM). We identified reasons why a possible donor did not become a utilized donor in accordance with WHO Critical Pathway for deceased donors [1]. The French cDCD programme is previously fully described by Antoine *et al.* [2]. Data are presented as median and interquartile range.

During the study period, 1744 patients were admitted and 333 patients (19.1%) died in the ICU: 61 (18.3%) were listed as brain death and 272 (81.7%) as circulatory death. Among circulatory death, 106 patients died after withdrawal of life-sustaining treatment (WLST) decision. Only 37 deceased after the WLST decision met the age criteria. Among them, 26 had irreversible brain damage. Eight patients were unsuitable for organ donation. Eighteen patients were referred to the ABM as potential donors. Median age of the potential donors was 49 [36–57] years. Median time from ICU admission to the WLST decision was 9 [7–13] days. Four refusals were registered, while six families talked spontaneously about organ donation. Refusal rate was 22.2% (4/18). One procedure was stopped because of the impossibility of joining the family. Finally, 13 patients were consented potential cDCD donors. Median times of agonal period and asystolic phase were 14 [12–25] min and 26 [24–27] min, respectively. Median time of functional warm ischaemia time (fWIT) quantified from the time of significant hypoperfusion when mean pressure is under 45 mmHg until organ preservation is performed was 30 [28–31] min. Two consented potential DCD donors did not go to organ donation because of prolonged agonal phase (>180 min), and then, only 11 became eligible donors. Ten patients were actual donors because of the failure of the first cannulation procedure. Ten patients became utilized donors. Twenty kidneys were explanted, and 19 were transplanted. Reason for nontransplantation was histologic anomaly on the left kidney. Five livers have been successfully explanted and transplanted. The conversion rate of potential donors into utilized donors (10/18) was 55.5%, and the organ per actual donor ratio was 2.4.

Liver procurement was authorized in February 2015 and concerned the last 11 included patients. Five livers were retrieved and transplanted. Reasons of nonliver procurement were cholestasis on the biopsy for one patient and hepatic failure before procedure for the other one. For all transplanted organs, there were no delayed graft function and no primary nonfunction. For kidney grafts, median cold ischaemia time was 770 [618–904] min, and median plasma creatinine rate at 6 months and at one-year follow-up after graft was 112 [95–135] and 116 [96–134] μmol/ml, respectively. For liver transplantation, patient and graft survival were both 100% after a median follow-up of 21 [20–27] months without biliary or vascular complications. The cDCD programme represents 17% of our donation activity. This led to the first French renal and hepatic transplants after cDCD [3,4]. In France, most deaths occur in hospital and particularly after WLST in ICU [5]. After acceptance of the WLST decision, families often indicate their relative's wish to organ donation after death, but French law did not allow cDCD before 2014. cDCD is the predominant procedure for organ donation in many countries. Particularity of the French programme was the following:

1. Age of the donor limited to 65 years (60 years before April 2016). Studies have found a synergic effect of the variables "age" and "WIT" on the risk of graft loss [6].

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Schlegel *et al.* [7] reported that donor age was not associated with liver graft survival. In Spain, cDCD donor's age has increased in the past years with good graft results with the wider use of abdominal normothermic regional perfusion (nRP) [8]. The authors emphasize the role of the abdominal nRP instead of rapid recovery for safely increasing the donor's age. As we use nRP as organ preservation technique, we should increase the age of donors in the next few years.

2. Agonal time is limited to 180 min. Except in United Kingdom for the kidney procurement, most country limited agonal time to 120 min. Expending agonal time up to 240 min in potential DCD donors has been suggested to increase actual donors with similar kidney graft results [9]. A policy of waiting at least 180 min is undoubtedly time-consuming, and logistical problems can be appeared because of the extended mobilization of organ recovery team, especially if an operating room (OR) is reserved during this period. In our protocol, the ICU localization for WLST and nRP implantation allows us to use OR for organ procurement only if nRP was successful. The 90 min of organ reperfusion with nRP can be used to plan the surgical operation.

3. We perform withdrawal and nRP within the ICU room in order to offer to the patient and the family a dignified end-of-life scene.

4. Systematic use of nRP for organ preservation. nRP was used to assess organ function (sequential biological evaluation) and limit endothelial damage and histological changes after reperfusion. In France, premortem heparinization and vascular access are permitted while nRP cannulation is only permitted in postmortem. Placement of vascular introducer is less invasive, produces less local complication, and does not interfere with the dying process, therefore eliminating the ethical limitation of premortem cannulation [8,10]. This procedure cannot be performed worldwide because premortem intervention is not allowed in several countries.

In the light of our small population size, these good graft outcomes are encouraging to pursue and extend cDCD programme in other centres in France. Added to the advantage of expanding the donor pool, the cDCD programme offers a new possibility for patients to become a donor and to realize an end-of-life personal project. These preliminary results will have to be confirmed by the publication of the national results of the French cDCD programme.

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Conflict of interest

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Availability of data and materials

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Consent for publication

Not applicable.

Ethics approval and consent to participate

This study was conducted in accordance with the French law. According to the French legislation, research studies based on the national registry CRISTAL are part of transplant outcomes assessment and do not require an ethics committee review or approval.

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