SANTANDER

Reunión Nacional de Coordinadores de Trasplantes

18 al 20 de octubre 2017

Extracción combinada (tórax-abdomen) en el donante tipo III. Situación actual, problemas y soluciones

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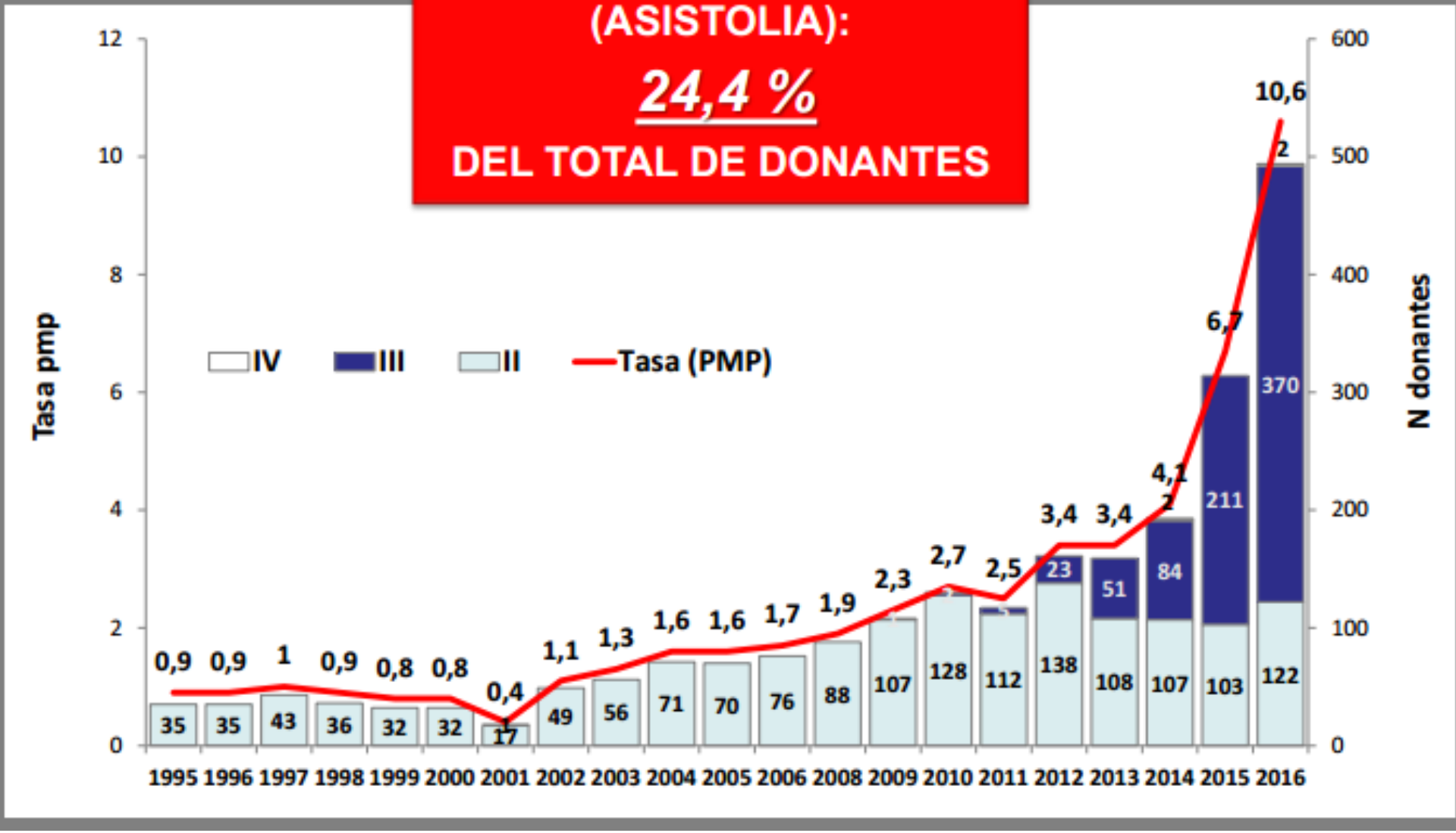
GOBIERNO DE ESPAÑA
MINISTERIO DE SANIDAD, SERVICIOS SOCIALES E IGUALDAD

DONANTES EN PARADA CIRCULATORIA (ASISTOLIA):

24,4 %

DEL TOTAL DE DONANTES



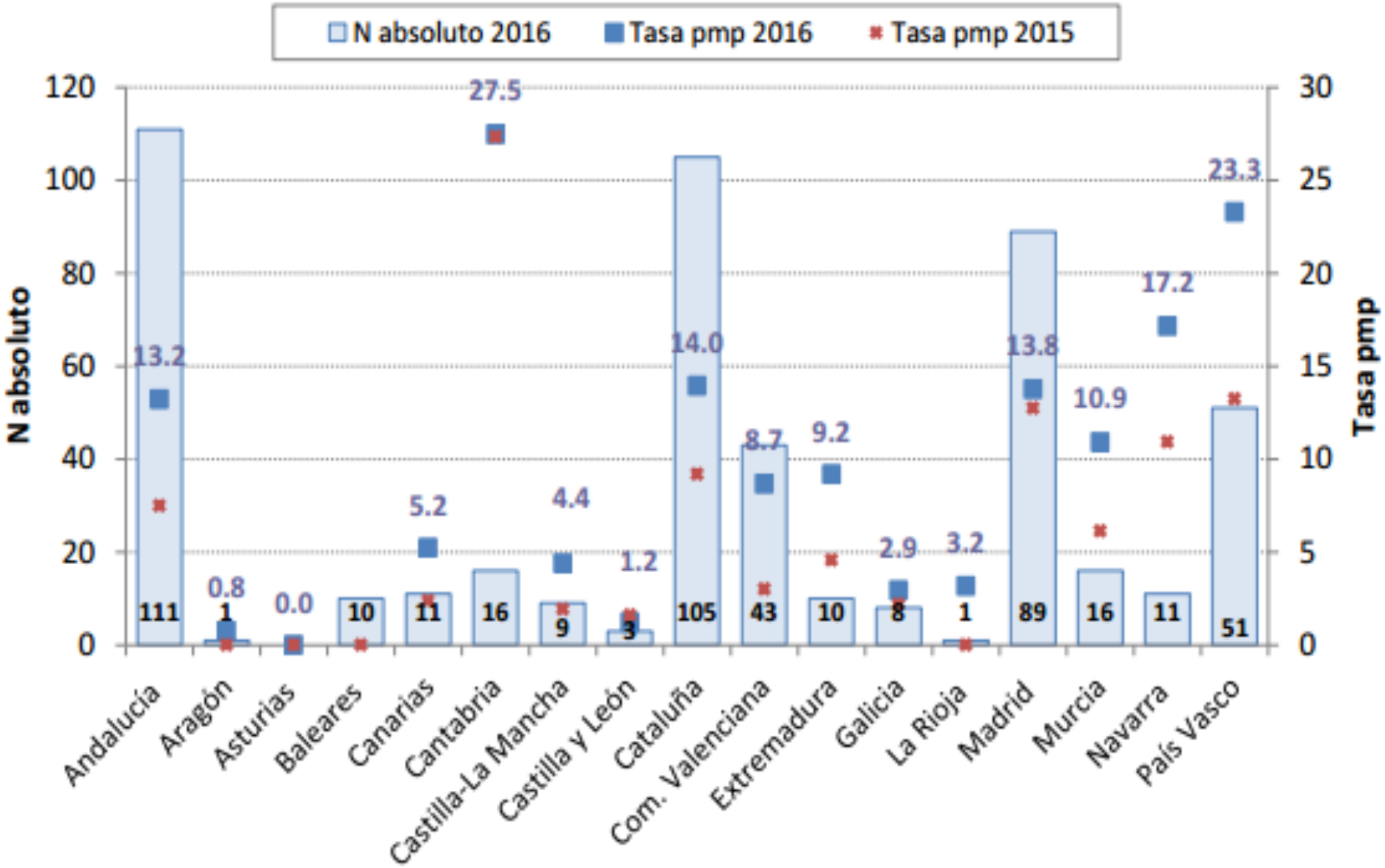
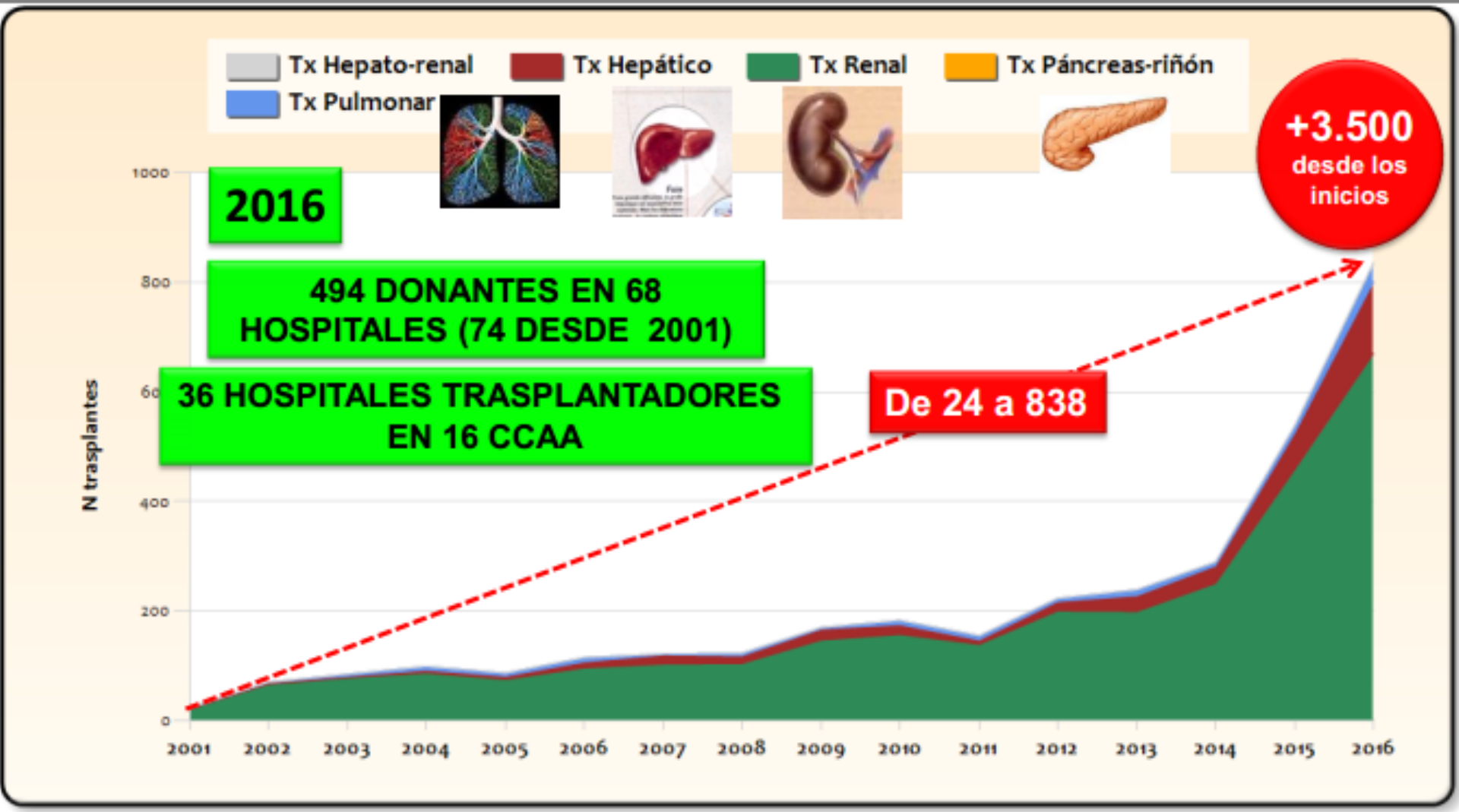


Figura 6. Donantes en asistolia generados en España por Comunidad Autónoma. España 2015-2016.

GOBIERNO DE ESPAÑA | MINISTERIO DE SANIDAD, SERVICIOS SOCIALES E IGUALDAD | ONT

TRASPLANTES EN ESPAÑA PROCEDENTES DE DONANTES EN ASISTOLIA 2001-2016



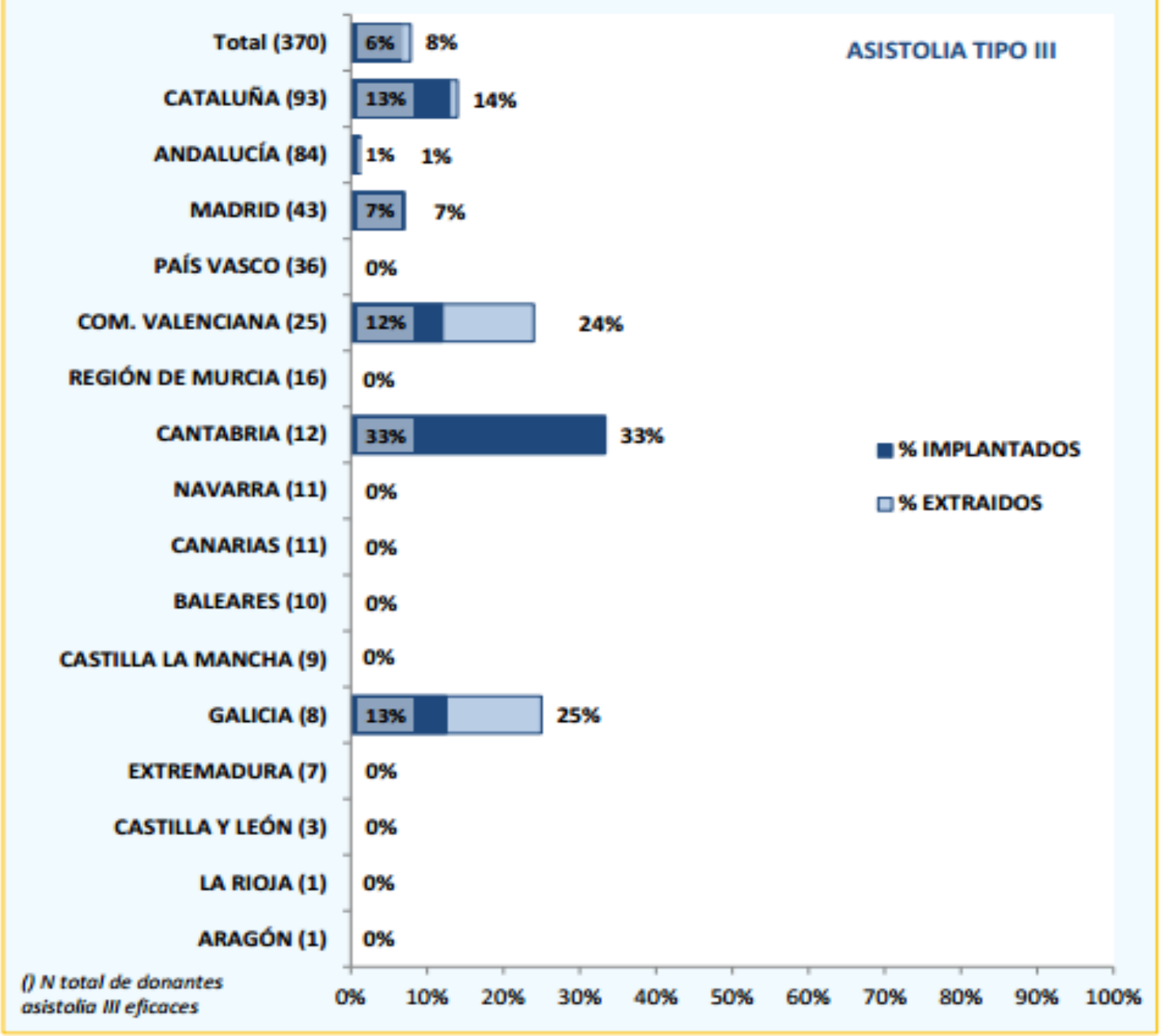
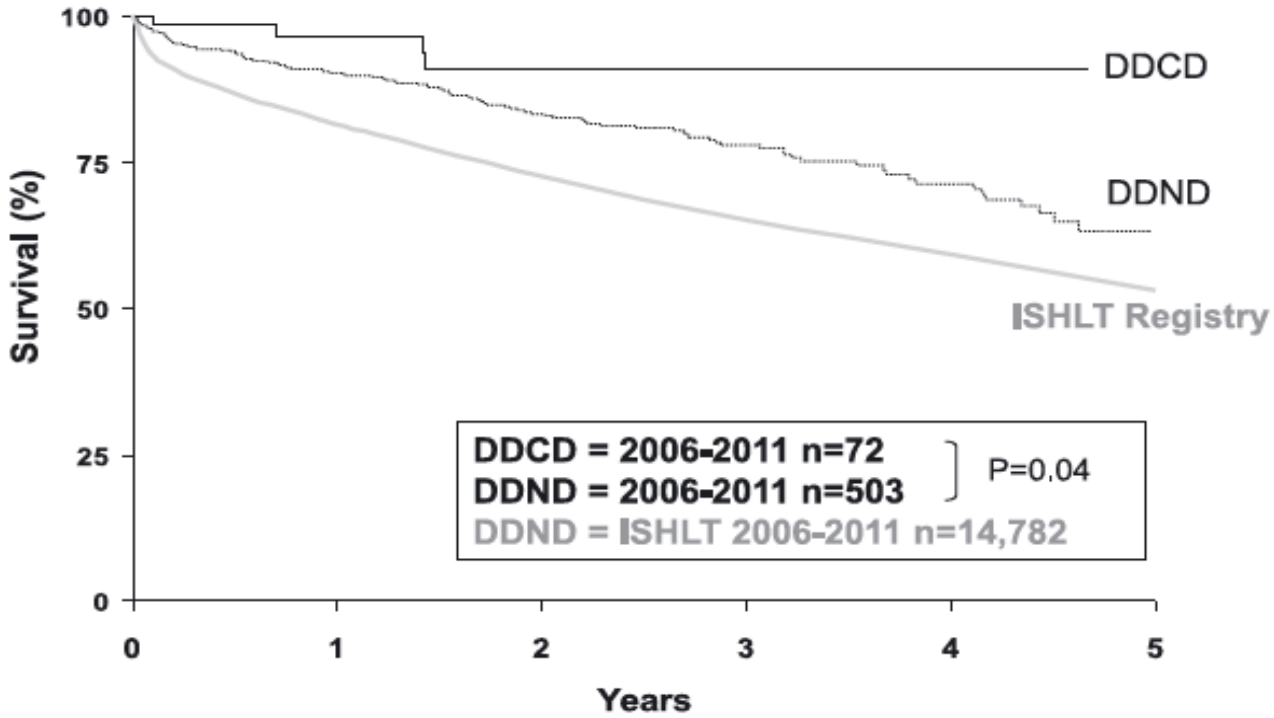


Figura 15. Porcentaje de donantes pulmonares en asistolia del total de los donantes eficaces en asistolia Tipo III de Maastricht por CCAA. España 2016.

Pulmones tipo III

Excellent Clinical Outcomes From a National Donation-After-Determination-of-Cardiac-Death Lung Transplant Collaborative

American Journal of Transplantation 2012; 12: 2406–2413
Wiley Periodicals Inc.

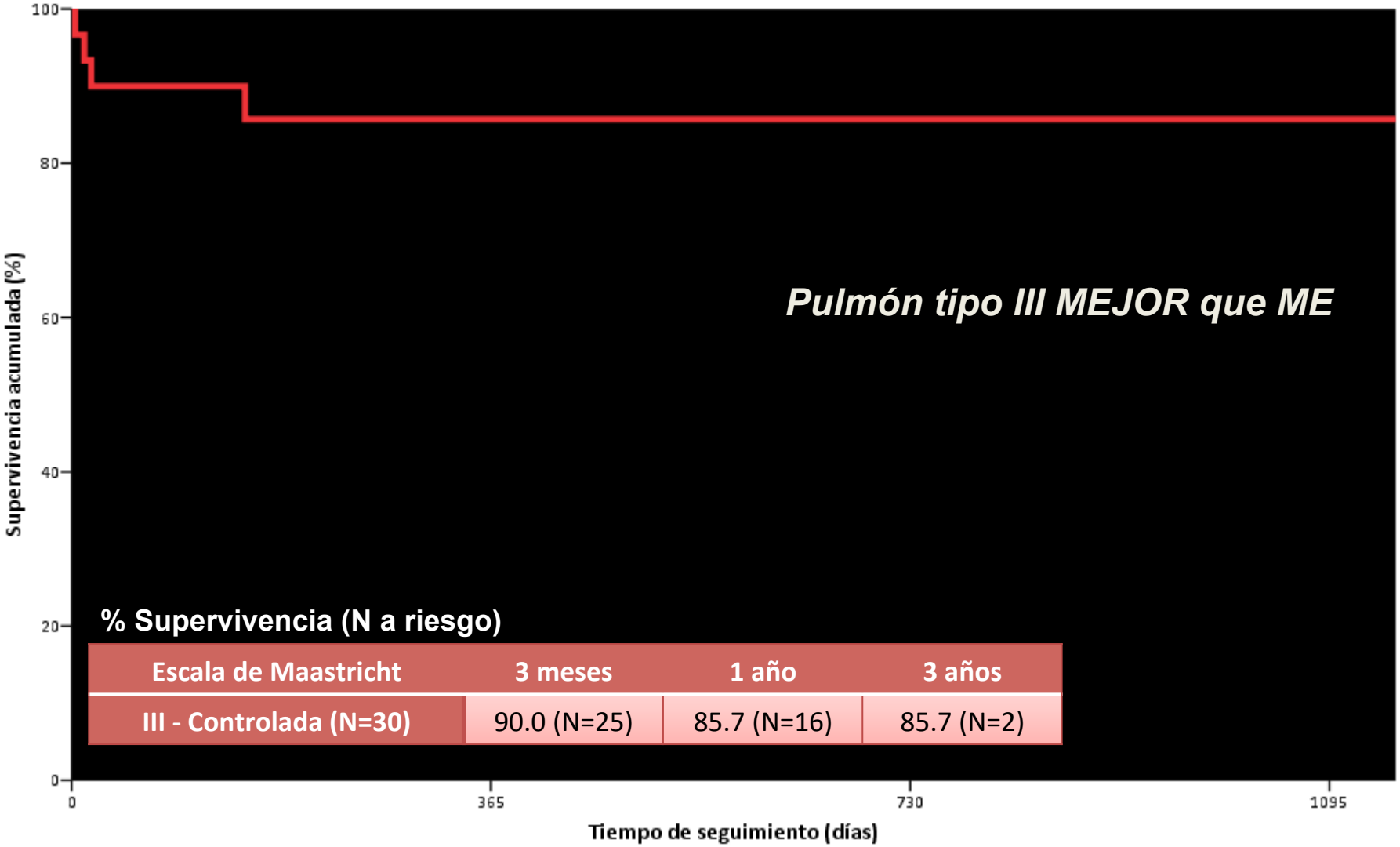


N= 72
97% año
90% a 5 años

TRASPLANTE PULMONAR ADULTO

Supervivencia Kaplan-Meier Donación en asistolia controlada

(Trasplantes: Enero 2001– Diciembre 2016)



% Supervivencia (N a riesgo)

Escala de Maastricht	3 meses	1 año	3 años
III - Controlada (N=30)	90.0 (N=25)	85.7 (N=16)	85.7 (N=2)

Criterios para ofertar un pulmón tipo III

1) Donante < 70 años?

2) Ausencia de secreciones purulentas

3) Rx tórax normal

4) Broncoscopia normal (debe estar hecha)

5) PaO_2/FiO_2 > 300 mm Hg con PEEP 5

6) No tabaquismo exagerado (< 20 paquetes/año)

Actuación de centro donante

Se avisará a la Coordinación de Trasplantes de centro receptor con al menos 8 horas de antelación. Lo ideal, preavisar el día anterior

Datos iniciales solicitados: antecedentes y gasometría, Rx tórax, grupo sanguíneo, altura y peso. Tipo de extracción abdominal.

EN ESTE PUNTO SE DESESTIMA O SE ACEPTA AL DONANTE. Solo en casos dudosos, la decisión se podría posponer al día siguiente

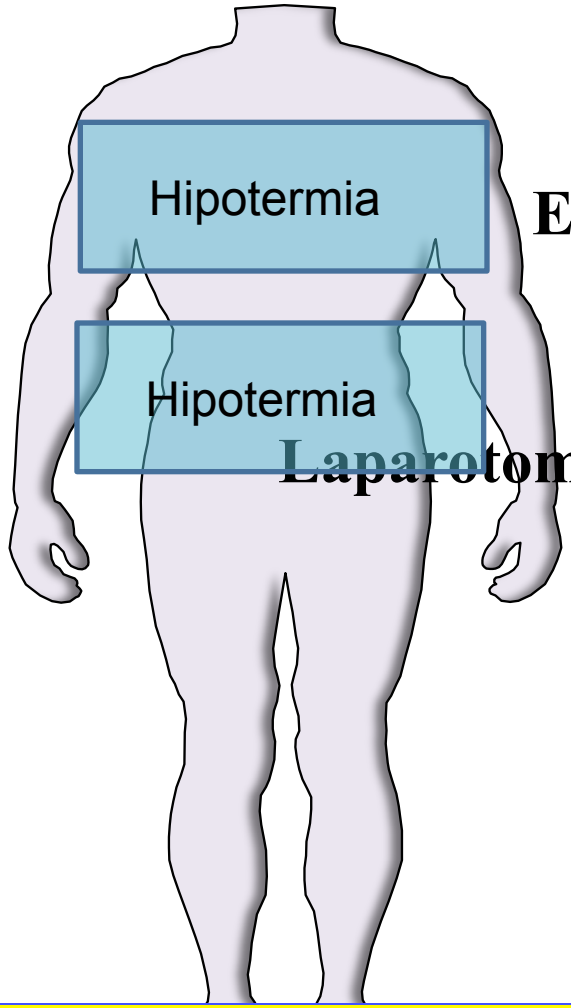
Al día siguiente a primera hora se reevalua al potencial donante y se confirma su actuación. El equipo de extracción pulmonar (cirujano torácico + enfermero) se desplazarán al centro donante a la hora convenida.

ESTARAN PRESENTES ANTES DE EXTUBAR AL DONANTE.

SUPERRÁPIDA

Reintubación y ventilación (100%)

Canulación arteria pulmonar + Perfadex HIELO



Esternotomía

Laparotomía y canulación aorta HIELO

Todo depende de los cirujanos

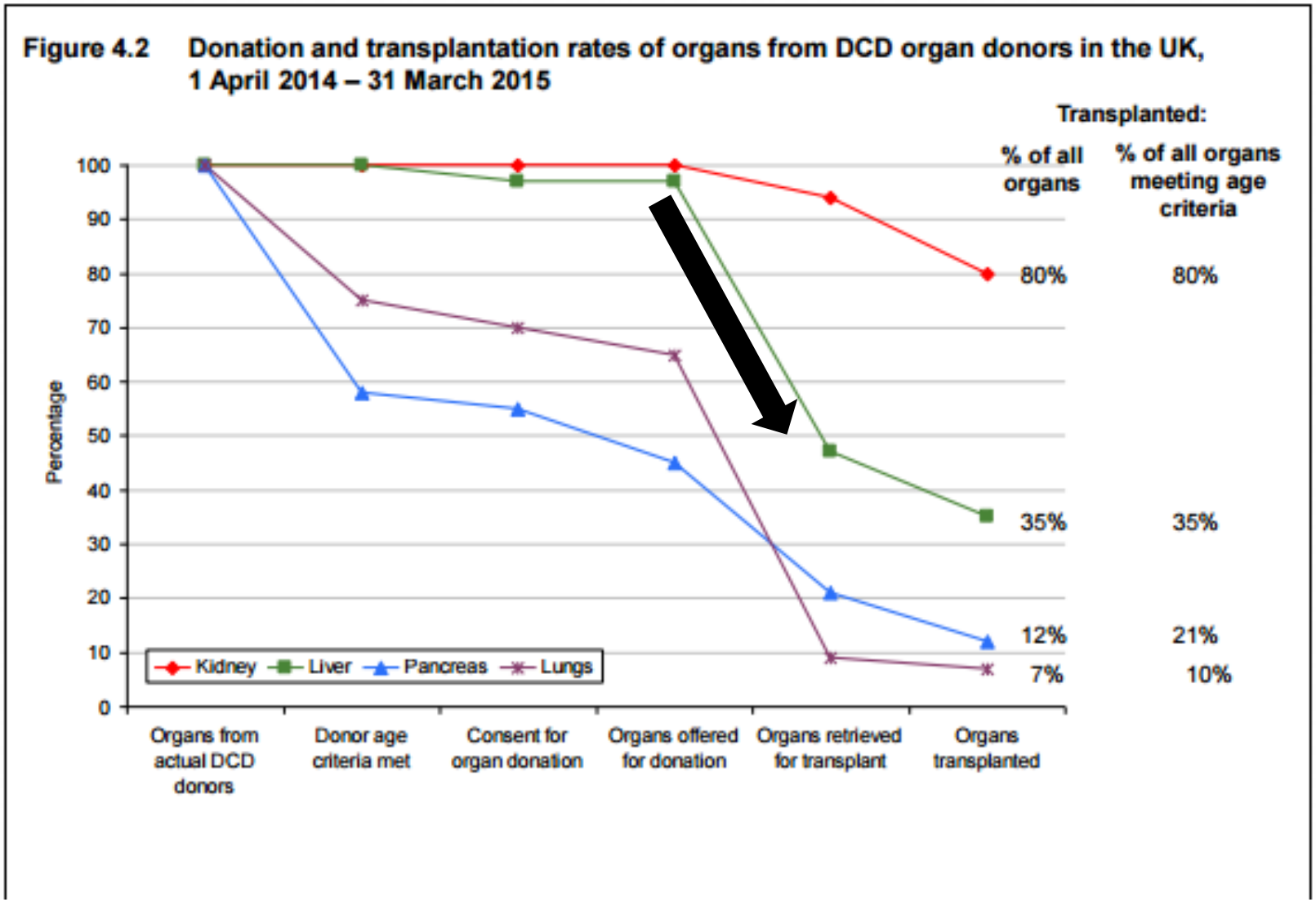
VENTAJAS DE LA SUPERRÁPIDA

1)No precisa tecnología

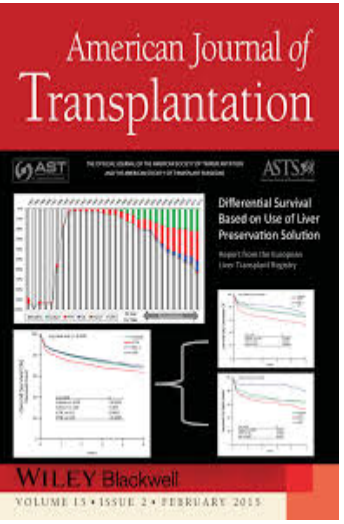
2)No problemas al canular

3)Genial para el pulmón, buena para el riñón, regular para el hígado y para el páncreas

Problemas: 1) La isquemia caliente para hígado y pancreas.
2) Tasa de descarte hepático y páncreatico ALARMANTE



http://nhsbtmediaservices.blob.core.windows.net/organ-donation-assets/pdfs/national_organ_retrieval_service.pdf



American Journal of Transplantation

AST AMERICAN SOCIETY OF TRANSPLANTATION

American Journal of Transplantation 2012; 12: 932–936
Wiley Periodicals Inc.

doi: 10.1111/j.1600-6143.2011.03882.x

Kidney Damage During Organ Recovery in Donation After Circulatory Death Donors: Data From UK National Transplant Database

<u>UK 2000-2010</u>: 12372 riñones de ME vs 888 riñones de DCD tipo III con superrápida

La tasa de lesion fue significativamente mayor en tipo III que en ME (11.4% vs 6.8%, $p < 0.001$).

Incremento significativo en lesiones capsulares, ureterales y vasculares Tipo III vs ME ($p = 0.002$, $p < 0.001$, $p = 0.017$).

Significativo aumento de descartes por iatrogenia tipo III vs ME $p = 0.002$.

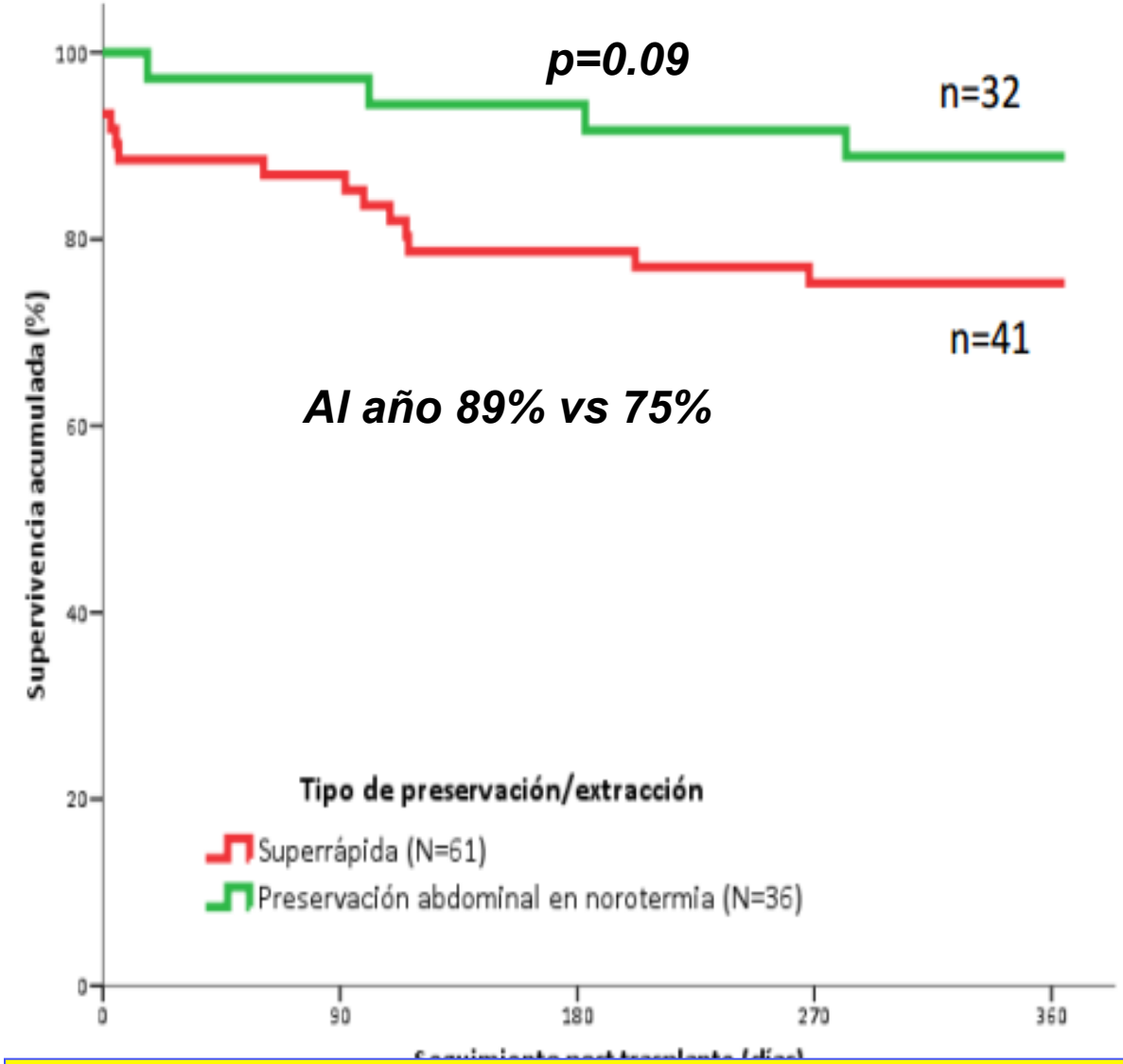


Figura 68. Supervivencia (Kaplan Meier) del injerto hepático (sin censurar fallecimientos) en función del tipo de preservación abdominal en la donación en asistolia controlada. Donación en asistolia, España. Trasplantes realizados entre 2012 y 2015.

La PRN ofrece mejores resultados postrasplante en hígado, y posiblemente en páncreas. ¿En riñones?

pRN con dispositivos ECMO

American Journal of Transplantation 2014; 14: 2181–2186
Wiley Periodicals Inc.

doi: 10.1111/ajt.12808

Case Report

Dual Temperature Multi-Organ Recovery From a Maastricht Category III Donor After Circulatory Death

G. C. Oniscu[1,*], A. Siddique[2] and J. Dark[3]

[1] Transplant Unit, The Royal Infirmary of Edinburgh

30–40% of the organ procurement activity (1). While controlled DCD donation (Maastricht categories III and IV) represents the main form of activity, several countries such

IVER TRANSPLANTATION 20:1012–1015, 2014

LETTER FROM THE FRONTLINE

One Donor, Two Types of Preservation: First Description of a Donation After Circulatory Death Donor With Normothermic Abdominal Perfusion and Simultaneous Cold Perfusion of Lungs

Received March 17, 2014; accepted April 17, 2014.

TO THE EDITORS:

tion of death; this maintains some features of the super-rapid technique, namely the rapid thoraco-

American Journal of Transplantation 2017; 17: 2165–2172
Wiley Periodicals Inc.

doi: 10.1111/ajt.14

Improving the Outcomes of Organs Obtained From Controlled Donation After Circulatory Death Donors Using Abdominal Normothermic Regional Perfusion

E. Miñambres[1,*], B. Suberviola[2], B. Dominguez-Gil[3], E. Rodrigo[4], J. C. Ruiz-San Millan[4], J. C. Rodríguez-San Juan[5] and M. A. Ballesteros[2]

[1]*Transplant Coordination Unit & Service of Intensive Care, University Hospital Marqués de Valdecilla-IDIVAL, School of Medicine, University of Cantabria, Santander, Spain*
[2]*Transplant Coordination Unit & Service of Intensive Care, University Hospital Marqués de Valdecilla-IDIVAL, Santander, Spain*
[3]*Organización Nacional de Trasplantes (ONT), Madrid, Spain*
[4]*Service of Nephrology, University Hospital Marqués de*

Abbreviations: ALT, alanine transaminase; AST, partate transaminase; cDCD, controlled donati after circulatory death; CIT, cold ischemic time; DE donation after brain death; DCD, donation after cir latory death; ECD, expanded-criteria donor; ECM extracorporeal membranous oxygenation; FW functional warm ischemic time; IC, ischemic chola giopathy; ICU, intensive care unit; IQR, interquart range; nRP, normothermic regional perfusion; PN primary nonfunction; RR, rapid recovery; WLS withdrawal of life-sustaining therapy

Received 04 December 2016, revised 04 January 20 and accepted for publication 21 January 2017

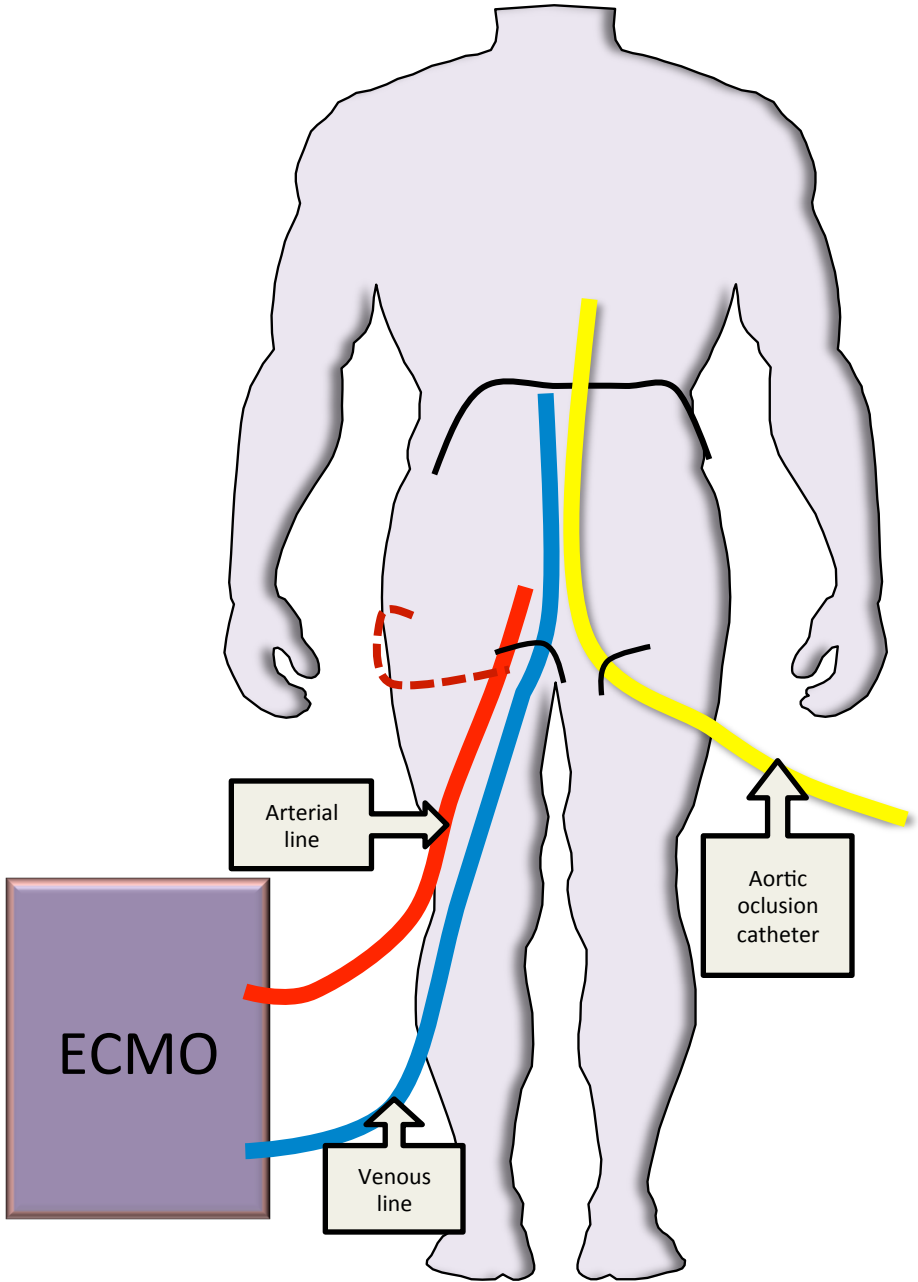
Another ethical concern relates to the possibility that once premortem interventions have been performed and WLST is undertaken, the patient does not die within the

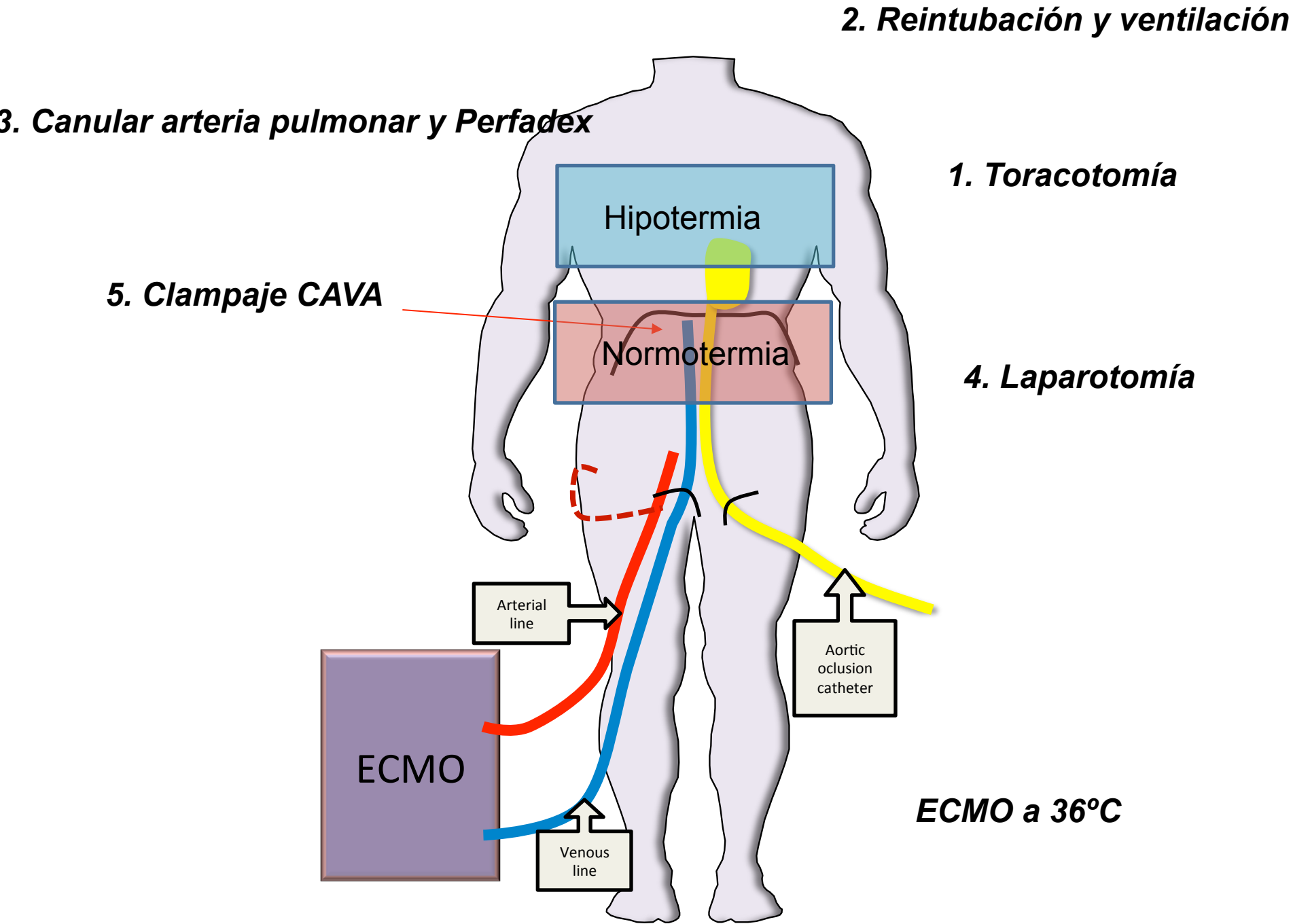
Our main difference with the UK proposal is that FWIT for abdominal grafts is reduced by a total of 10–15 min (abdominal laparotomy, clamp of the thoracic aorta, and cannulation of femoral artery and vein). Thus, in our

view, there is no need for strict topical cooling of both lungs because the FWIT for lungs is also shortened. Therefore, the risk of potential transdiaphragmatic cooling of the liver is minimized.

2. NHS Blood and Transplant. Organ donation and transplantation activity report 2015/16. [cited 2016 Aug 10]. Available from: http://www.odt.nhs.uk/pdf/activity-report/activity_report_2015_16.pdf.
3. Goldberg DS, Abt PL. Improving outcomes in DCDD liver trans-

Miñambres et al. Am J Transplant 2017


Arterial line
Aortic oclusion catheter
ECMO
Venous line


2. Reintubación y ventilación
3. Canular arteria pulmonar y Perfadex
1. Toracotomía
Hipotermia
5. Clampaje CAVA
Normotermia
4. Laparotomía
Arterial line
Aortic oclusion catheter
ECMO
Venous line
ECMO a 36ºC

PROBLEMAS

American Journal of Transplantation 2016; 16: 2293–2299
Wiley Periodicals Inc.

doi: 10.1111/ajt.1379

Personal Viewpoint

Ethical Issues in the Use of Extracorporeal Membrane Oxygenation in Controlled Donation After Circulatory Determination of Death

A. L. Dalle Ave[1,2,*], D. M. Shaw[3] and J. L. Bernat[4]

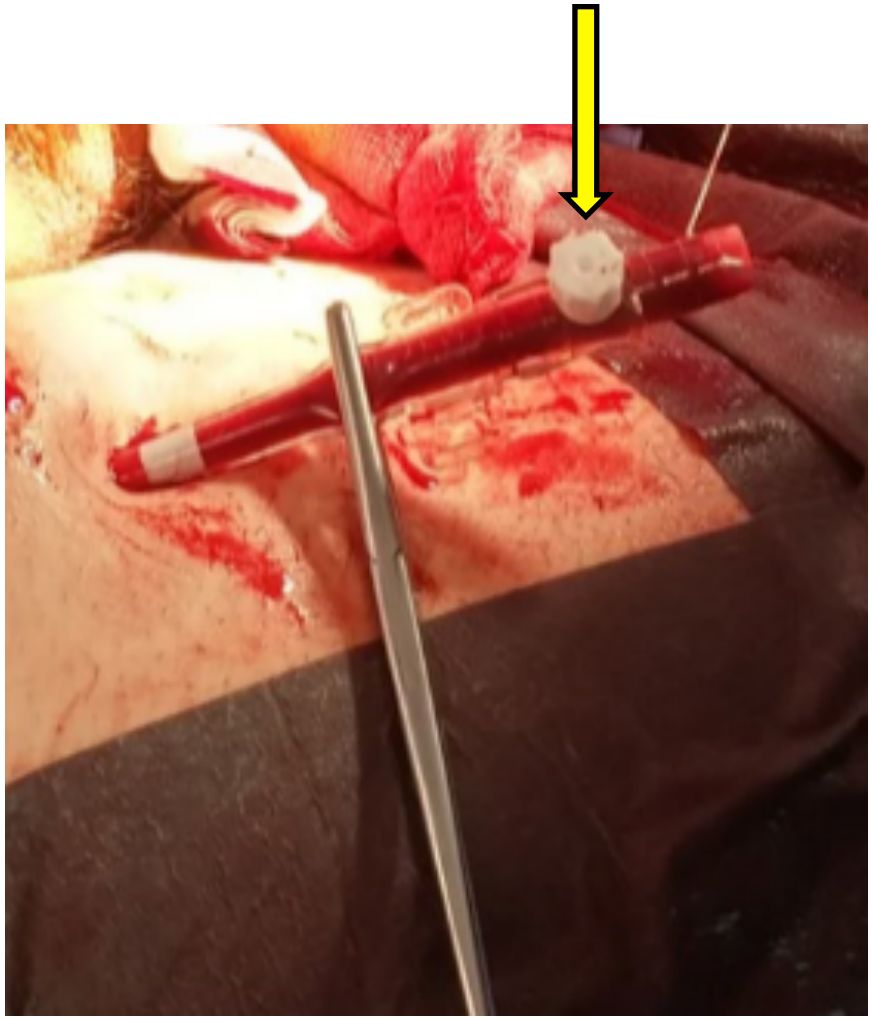
[1]Ethics Unit, University hospital of Lausanne, Lausanne, Switzerland
[2]Institute for Biomedical Ethics, University Medical Center, Geneva, Switzerland

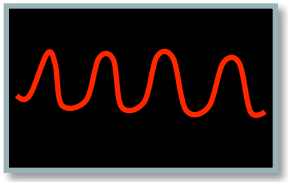
Received 17 December 2015, revised 25 February 201 and accepted for publication 03 March 2016

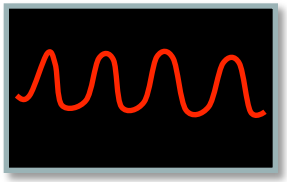
Introduction

1 DE 7

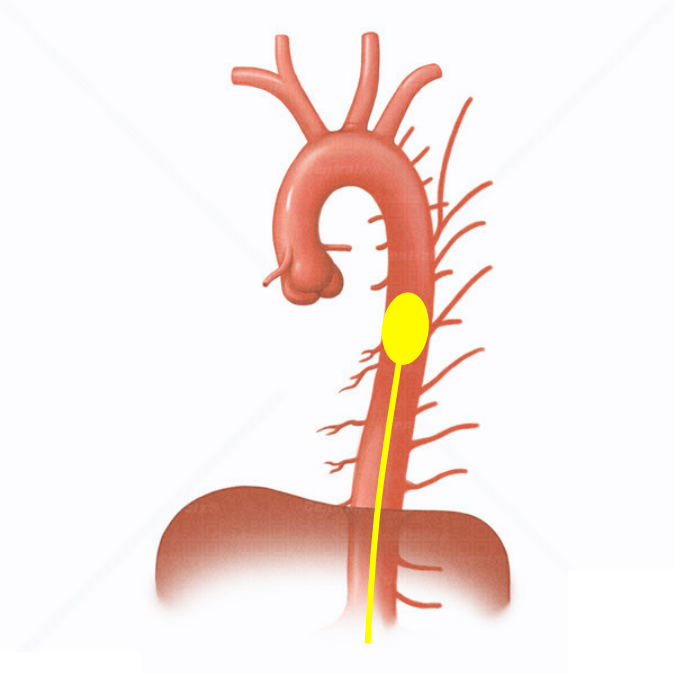
Evidence of the benefit of ECMO for future graft outcome is weak. Other techniques, such as rapid recovery and ISP, are more appropriate because they avoid the ethical issues.

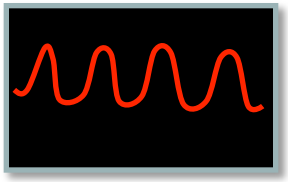




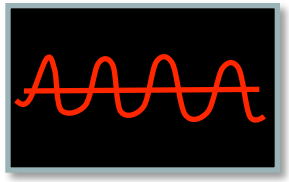


Antes de extubar (paciente vivo)



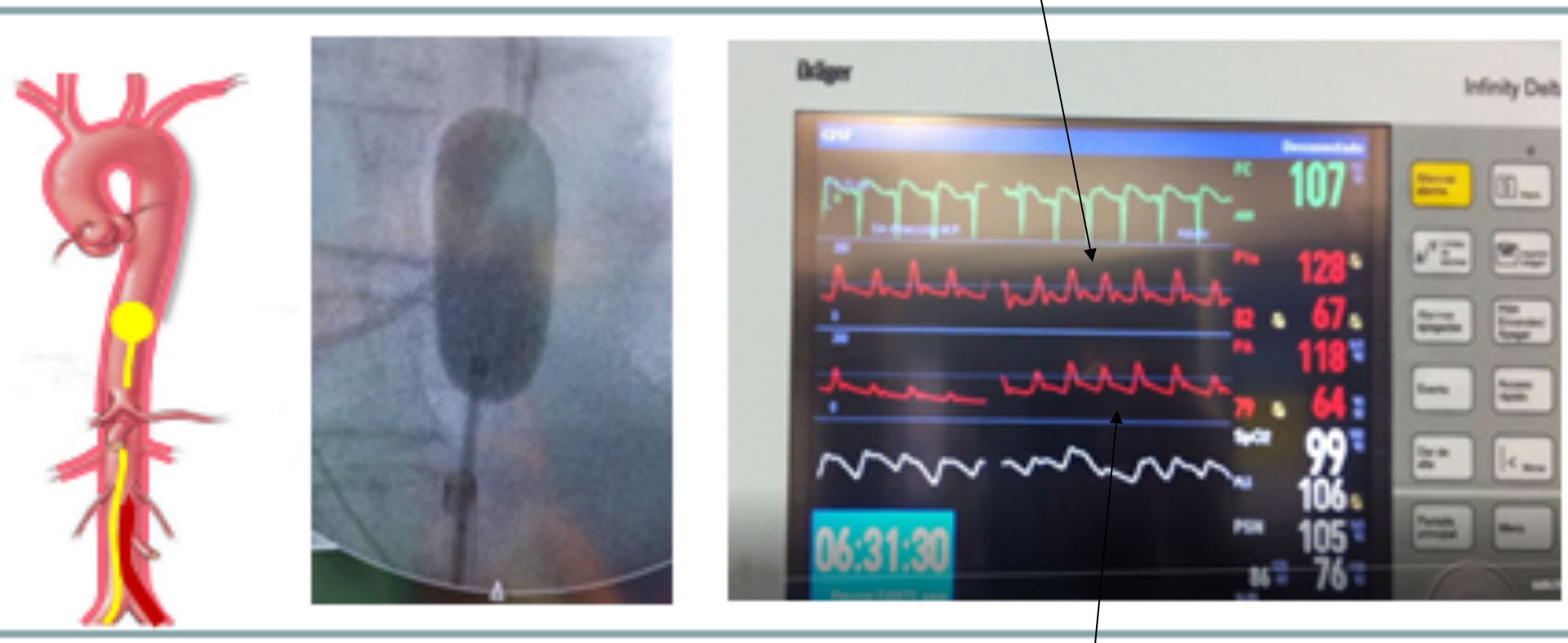


Arteria radial



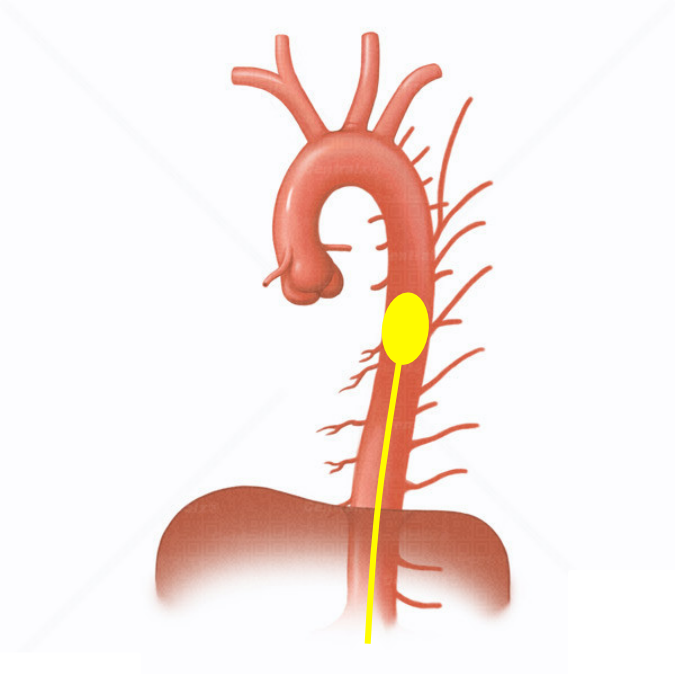
Arteria femoral

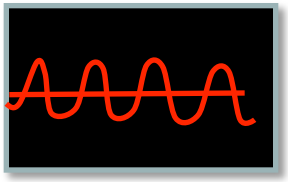
Radial artery



Femoral artery

Tras fallecimiento





Arteria radial

Arteria femoral

American Journal of Transplantation 2017; 17: 2165–2172
Wiley Periodicals Inc.

doi: 10.1111/ajt.14214

Improving the Outcomes of Organs Obtained From Controlled Donation After Circulatory Death Donors Using Abdominal Normothermic Regional Perfusion

E. Miñambres[1,*], B. Suberviola[2], B. Dominguez-Gil[3], E. Rodrigo[4], J. C. Ruiz-San Millan[4], J. C. Rodríguez-San Juan[5] and M. A. Ballesteros[2]

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**Corresponding author: Eduardo Miñambres, eminambres@yahoo.es*

The use of donation after circulatory death (DCD) has increased significantly during the past decade. However, warm ischemia results in a greater risk for transplantation. Indeed, controlled DCD (cDCD) was associated with inferior outcomes compared with donation after brain death. The use of abdominal normothermic regional perfusion (nRP) to restore blood flow before organ recovery in cDCD has been proposed as better than rapid recovery to reverse the effect of ischemia and improve recipients' outcome. Here, the first Spanish series using abdominal nRP as an *in situ* conditioning method is reported. A specific methodology to avoid restoring circulation to the brain after death determination is described. Twenty-seven cDCD donors underwent abdominal nRP during at least 60 min. Thirty-seven kidneys, 11 livers, six bilateral lungs,

Abbreviations: ALT, alanine transaminase; AST, aspartate transaminase; cDCD, controlled donation after circulatory death; CIT, cold ischemic time; DBD, donation after brain death; DCD, donation after circulatory death; ECD, expanded-criteria donor; ECMO, extracorporeal membranous oxygenation; FWIT, functional warm ischemic time; IC, ischemic cholangiopathy; ICU, intensive care unit; IQR, interquartile range; nRP, normothermic regional perfusion; PNF, primary nonfunction; RR, rapid recovery; WLST, withdrawal of life-sustaining therapy

Received 04 December 2016, revised 04 January 2017 and accepted for publication 21 January 2017

Introduction

The persistent mismatch between supply and demand of organs for transplantation has led the transplant community to reconsider donation after circulatory death (DCD) as a strategy to increase the donor pool (1).

However, the unpredictable consequences of warm ischemia, which characterizes controlled DCD (cDCD), together with poor organ perfusion during the agonic phase, result in a reluctance to use livers and pancreases from these donors, with recovery rates 20–50% lower than those from donation after brain death (DBD) donors (2,3).

In cDCD, the effects of warm ischemia during the hypotensive phase after the withdrawal of life-sustaining therapy (WLST) and, after circulatory arrest, are further exacerbated during the later period of cold ischemia. These phenomena result in a higher incidence of primary nonfunction (PNF) and delayed graft function (DGF) in

Resuscitation 117 (2017) 46–49

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Short paper

Validation of a new proposal to avoid donor resuscitation in controlled donation after circulatory death with normothermic regional perfusion

Jose Miguel Perez-Villares[a], Juan José Rubio[b], Francisco del Río[c], Eduardo Miñambres[d,*]

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[b] Transplant Coordination Unit & Service of Intensive Care, University Hospital Puerta de Hierro, Madrid, Spain
[c] Transplant Coordination Unit & Service of Intensive Care, University Hospital Clínico San Carlos, Madrid, Spain
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Cerebral resuscitation
Normothermic regional perfusion

ABSTRACT

Aim: The use of abdominal normothermic regional perfusion (nRP) and premortem interventions in controlled donation after circulatory death (cDCD) may represent a significant advance to increase the number and quality of grafts recovered in cDCD. The main limitation for the widespread acceptance of nRP in cDCD is the concerns of restoring circulation to the brain once death has been declared should the thoracic aorta not be adequately blocked.
Methods: We describe and validate a specific methodology to ensure an appropriate blocking of the thoracic aorta in a multicenter study using this technique.
Results: A total of 78 procedures with premortem cannulation and abdominal nRP were performed in four different hospitals. No case of heart or brain resuscitation was observed after nRP
Conclusion: The use of premortem interventions before nRP and the aortic occlusion balloon may increase the number of grafts recovered in cDCD. Our proposed methodology avoids the ethical problem of

BIS monitorización

1.- Insert left radial, ECMO and aortic occlusion catethers before WLST

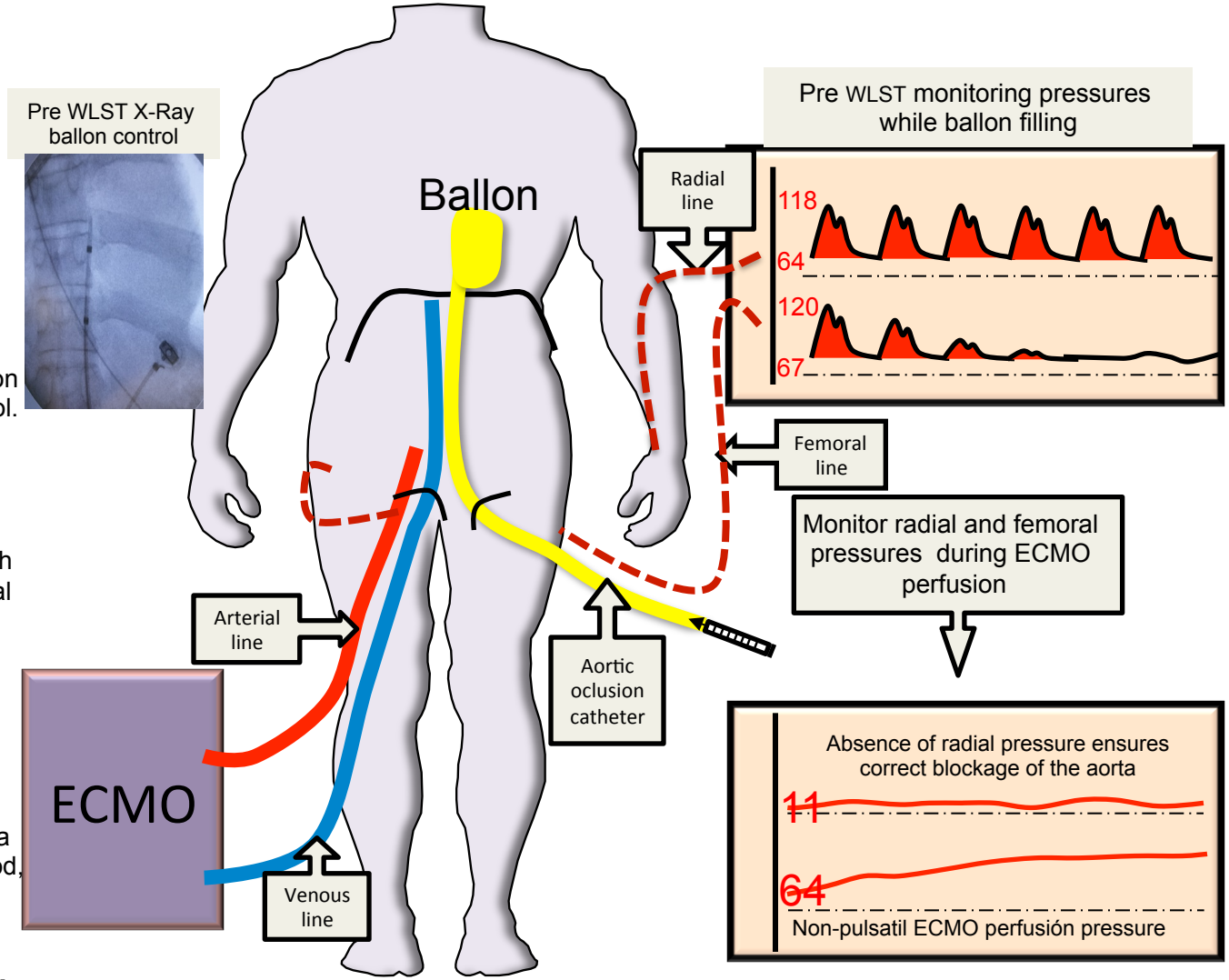
2.- .- Monitor femoral and radial artery pressures while filling the oclussion ballon a few seconds. The femoral pulse should disappear while radial pulse is maintained. Record the filling volume as the minimum volume to be used to block the aorta during nRP.

3.- Check the correct position of the occlusion catheter in the thoracic aorta by X-ray control.

4.- After death declaration fill the occlusion catheter ballon and start nRP.

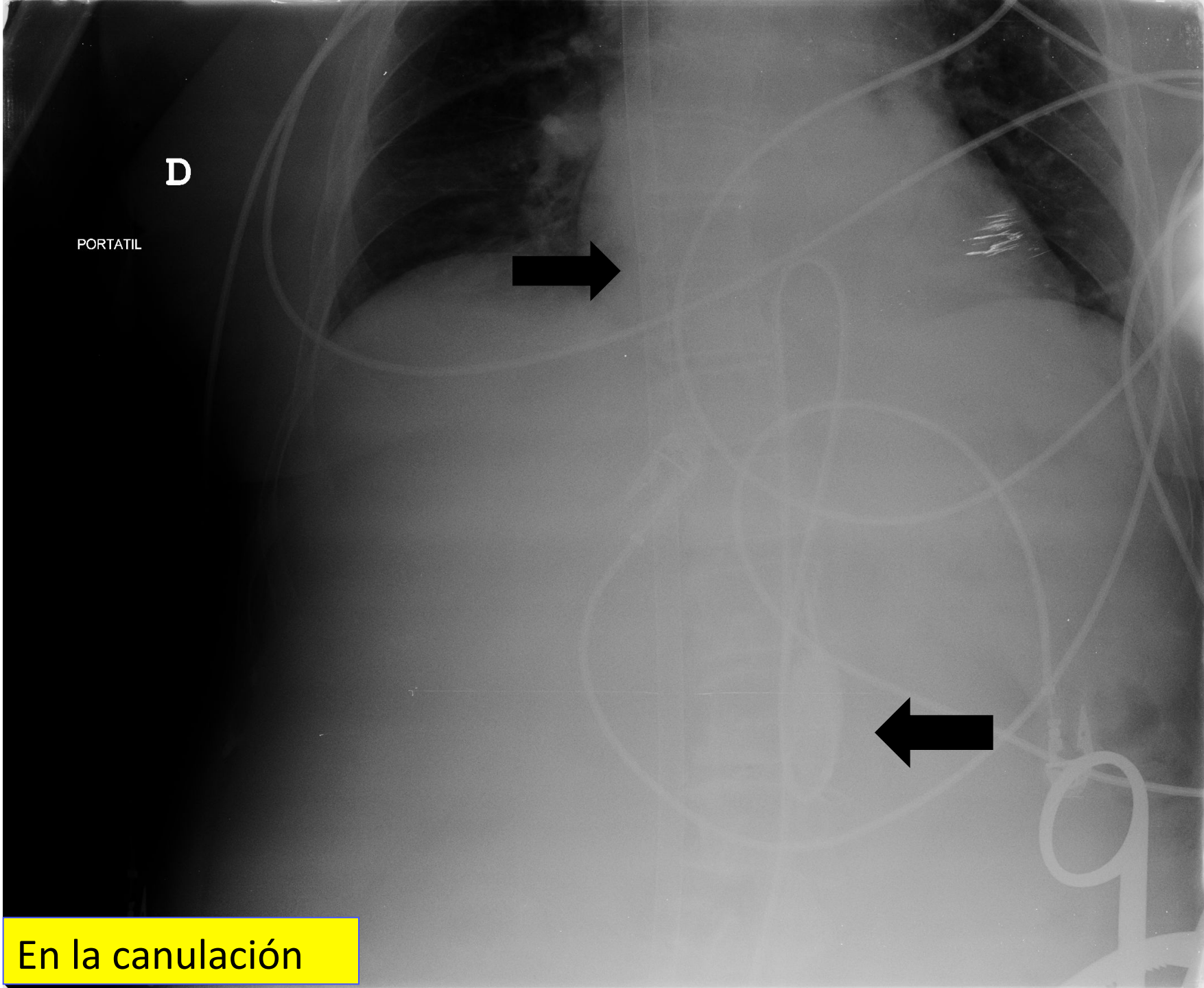
5.- During nRP continuous monitoring of both pressures should be maintained. While radial artery shows baseline post cardiac arrest values, femoral line show a non-pulsatile ECMO perfusion pressure.

6.-If radial pressure increases parallel to increase in femoral pressure, stop nRP and check the correct position of the aortic occlusion catether or clamp de thoracic aorta after another five minutes of non-touch period, before to restore ECMO perfusion



Perez-Villares JM, Rubio JJ, Del Río F, Miñambres E. Validation of a new proposal to avoid donor resuscitation in controlled donation after circulatory death with normothermic regional perfusion. Resuscitation 2017;117:46-49.

Miñambres E, Suberviola B, Dominguez-Gil B, Rodrigo E, Ruiz-San Millan JC, Rodríguez-San Juan JC, Ballesteros MA. Improving the outcomes of organs obtained from controlled donation after circulatory death donors using abdominal normothermic regional perfusion. Am J Transplant 2017;17:2165-2172



En la canulación

Uso de guías metálicas; impiden el bucle y permiten subir y bajar el balón
Realmente: escopia

Sospecha de rotura de gran vaso durante canulación

Extubar, confirmar exitus y reconvertir a Superrápida

2. Reintubación y ventilación

3. Canular arteria pulmonar y Perfadex

1. Toracotomía

5. Clampaje CAVA

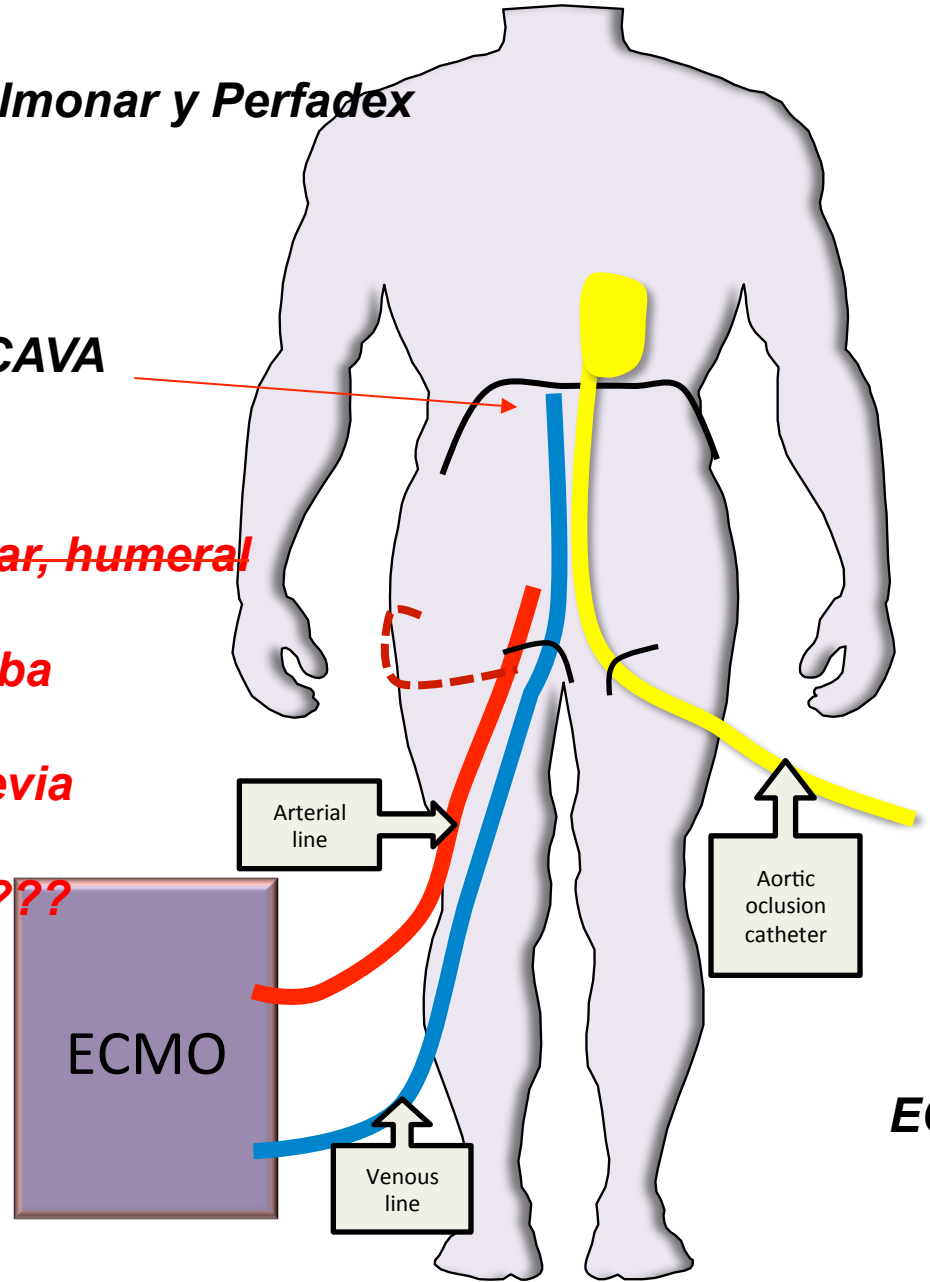
4. Laparotomía

1) ~~Subclavia, yugular, humeral~~

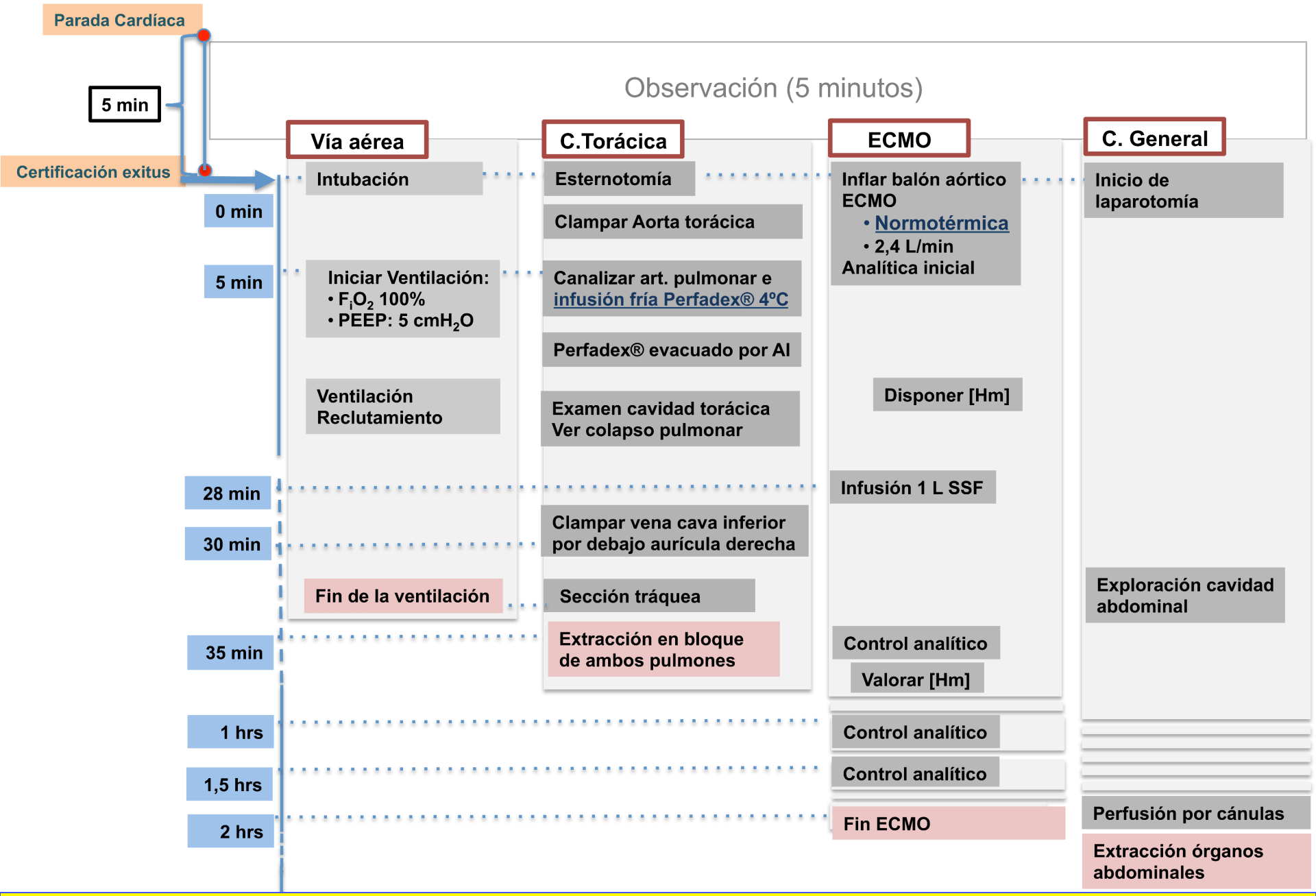
2) Caida Flujo Bomba

3) Fluidoterapia previa

4) Duración ECMO???



ECMO a 36ºC



Isquemia caliente funcional para el pulmón: 60 minutos

Identificación

Código ONT:	13130385	Código Proceso:	25017854
Hospital:	H. UNIV. MARQUÉS DE VALDECILLA	Comunidad Autónoma:	CANTABRIA
CCAA de Residencia:	CANTABRIA		
Nombre y Apellidos :	[redacted]LA	Tipo de Donante :	Asistolia
Sexo:	Mujer	Edad:	36 años
Grupo Sanguíneo:	O	Rh:	-
Consulta :	☐		
Causa de Muerte:	ACVA	Fecha de Muerte:	
Fecha Comunicación:	[redacted]/2016 12:36	Fecha Admisión :	
Eficaz por CCAA:	☐	Donante con Riesgo No Estándar:	☐
Alerta de Vigilancia:	☐		
Donante:	Eficaz	Fecha Extracción:	[redacted]/2016 19:20
Órganos valorados:	Hígado, Riñón Derecho, Riñón Izquierdo, Pancreas, Pulmón Izquierdo, Pulmón Derecho	Extracciones Tejidos:	
Fecha Isquemia:	[redacted]/2016 20:00	Terapia Celular:	

- ✓ Identificación
- ✓ Datos Generales
- ✓ Antecedentes
- ✓ Datos Asistolia
- ✗ Mantenimiento
- ✗ Inmunología
- ✗ Estudios Analíticos
- ✓ Estudios Instrumentales
- ✗ Estudios Anatómicos
- ✗ Valoraciones
- ✗ Extracciones
- ✗ Cruce PATHI
- Seguimiento
- Informes

Seguimiento

Procesos

3 elementos encontrados, mostrando todos los elementos.
Página 1

		Fecha	Órgano	Estado	Información
○	ONT	[redacted]	Riñón Izquierdo,Pancreas	Cerrada	Trasplantada - H. UNIV. MARQUÉS DE VALDECILLA
○	ONT	[redacted]	Hígado	Cerrada	Trasplantada - H. UNIV. MARQUÉS DE VALDECILLA
○	ONT	[redacted]	Pulmón Izquierdo,Pulmón Derecho	Cerrada	Trasplantada - H. UNIV. MARQUÉS DE VALDECILLA

Código ONT:	13185722	Código Proceso:	25136390
Hospital:	H. UNIV. MARQUÉS DE VALDECILLA	Comunidad Autónoma:	CANTABRIA
CCAA de Residencia:	CANTABRIA		
Nombre y Apellidos	[redacted]	Tipo de Donante :	Asistolia
Sexo:	Hombre	Edad:	14 años
Grupo Sanguíneo:	A	Rh:	+
Consulta :	☐		
Causa de Muerte:	Encefalopatía Anóxica	Fecha de Muerte:	[redacted]
Fecha Comunicación:	[redacted]2	Fecha Admisión :	
Eficaz por CCAA:	☐	Donante con Riesgo No Estándar:	☐
Alerta de Biovigilancia:	☐		
Donante:	Eficaz	Fecha Extracción:	[redacted]
Órganos valorados:	Hígado, Riñón Derecho, Riñón Izquierdo, Pancreas, Pulmón Derecho, Pulmón Izquierdo	Extracciones Tejidos:	
Fecha Isquemia:	[redacted]	Terapia Celular:	

- ✓ Identificación
- ✓ Datos Generales
- ✗ Antecedentes
- ✓ Datos Asistolia
- ✗ Mantenimiento
- ✗ Inmunología
- ✗ Estudios Analíticos
- ✗ Estudios Instrumentales
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		Fecha	Órgano	Estado	Información
○	ONT	[redacted]	Riñón Izquierdo,Pancreas	Cerrada	Trasplantada - CHUAC (H. JUAN CANALEJO)
○	ONT	[redacted]	Pulmón Derecho,Pulmón Izquierdo	Cerrada	Trasplantada - H. UNIV. MARQUÉS DE VALDECILLA
○	ONT	[redacted]	Hígado	Cerrada	Trasplantada - H. UNIV. MARQUÉS DE VALDECILLA

Extending normothermic regional perfusion to the thorax in donors after circulatory death

Steven S.L. Tsui[a] *and Gabriel C. Oniscu*[b]

Current Opin Organ Transplant 2017

Purpose of review

Despite a significant increase in the utilization of donors after circulatory death (DCD), the number of organs recovered and their function are largely inferior to those from donors after brain death. This review summarizes recent advances in *in-situ* normothermic regional perfusion of DCD organs prior to procurement.

Recent findings

The combination of warm and cold ischemia in DCD donation are detrimental to organ function. As a consequence, the acceptance criteria are far more restrictive and many organs are discarded.

The application of extracorporeal circulation technology to DCD organ retrieval in the form of abdominal normothermic regional perfusion (NRP) made a significant impact on organ procurement. DCD heart transplantation has been made possible by technological developments of *ex-situ* preservation. Extending NRP to include cardio-thoracic organs is a recent development enabling conversion from a DCD to a donor after brain death–type procurement.

NRP offers the opportunity for a dynamic assessment of function and may lead to expansion of acceptance criteria as well as allowing for early interventions to modulate organ function.

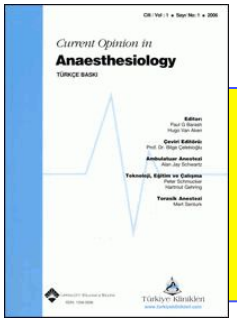
Summary

Thoraco-abdominal NRP may become the new gold standard for DCD organ retrieval. Further research and education are required to streamline logistics, define organ function markers and increase acceptance and utilization.

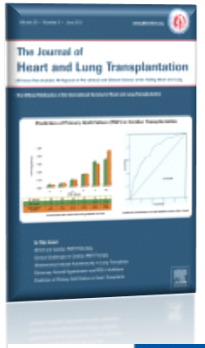
Keywords

donation after circulatory death, graft assessment, organ procurement, thoraco-abdominal normothermic regional perfusion

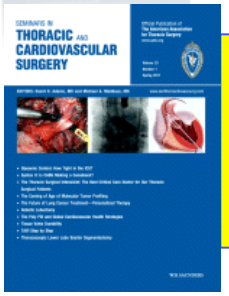
Who cares for the donor?



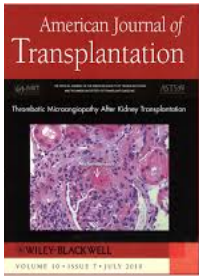
Pickett et al. Failure to provide adequate physiological support to potential donors accounts for 10 to 25% lost donor organs. Curr Opin Anaesthes 1994;7:80-83



Wheeldon et al. Donor management remains one of the most neglected areas for transplantation. J Heart Lung Transplant 1995;14:734-42



Shigemura N et al. Pitfalls in donor lung procurements: how should the procedure be taught to transplant trainees? J Thorac Cardiovasc Surg 2009;138:486-90



Singbartl K et al. Intensivist-led management of brain-dead donors is associated with an increase in organ recovery for transplantation. Am J Transplant 2011; 11: 1-5

CONCLUSIONES

El pulmón tipo III es tan bueno o mejor que el de ME. Debe plantearse su donación SIEMPRE

El pulmón tipo III NO perjudica al hígado, pancreas ni riñones.

El procedimiento con superrápida es muy sencillo, pero perjudica al hígado y al pancreas (*electivo si pulmón/riñón?)*

El procedimiento con nRP es MEJOR, pero técnicamente más complejo y puede "echar a perder un donante"

CONCLUSIONES

Los dispositivos ECMO son una revolución. TRASPLANTE CARDIACO

La formación del Coordinador es fundamental: improvisar, resolver problemas, decisiones difíciles…….

Amabilidad y simpatía con los equipos de trasplante pulmonar……., y cardiaco

Estrategias colaborativas entre centros

Gracias por su atención