



RESULTADOS DE LA ASISTENCIA CIRCULATORIA MECÁNICA DE CORTA DURACIÓN



EDUARDO BARGE CABALLERO
UNIDAD DE IC AVANZADA
SERVICIO DE CARDIOLOGÍA
COMPLEJO HOSPITALARIO UNIVERSITARIO A CORUÑA



EUROPEAN HEART FAILURE AWARENESS DAY



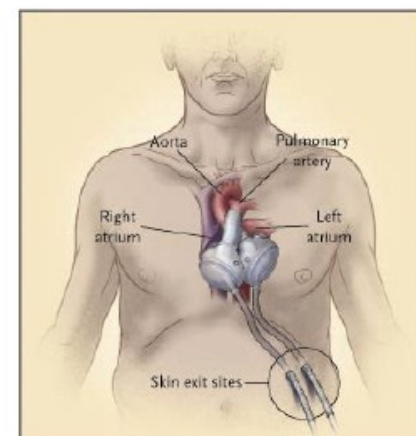
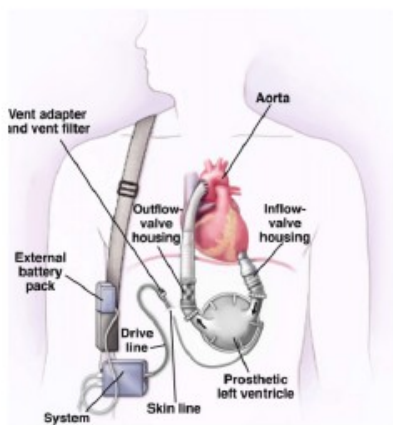
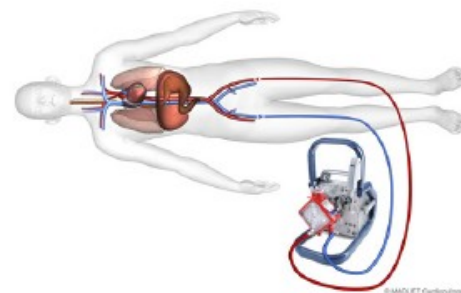
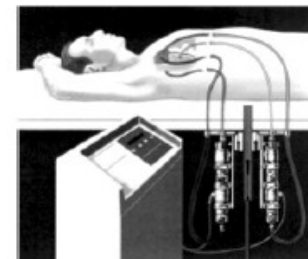
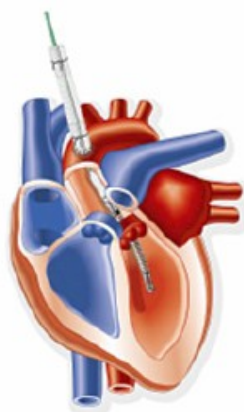
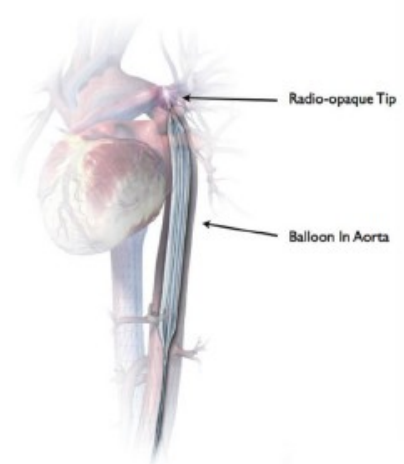
Is your heart failing?
Do you have unexplained shortness of breath, swollen ankles?
Go to www.heartfailurematters.org

If this does not answer your questions, please contact your doctor.





ASISTENCIA CIRCULATORIA MECÁNICA DISPOSITIVOS





ASISTENCIA CIRCULATORIA MECÁNICA

PERFILES INTERMACS

NYHA IV

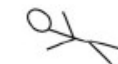
NYHA III

INTERMACS PROFILE-LEVEL	% of VADs 2010-11 N=2245	Trial Subjects With LVADs	Official Shorthand	Modifier options
INTERMACS 1	13%	REMATCH ADVANCE	"Crash and burn"	+ Arrhythmia, + Temporary Circ Support
INTERMACS 2	42%		"Sliding fast" despite inotropic support	+ Arr, TCS
INTERMACS 3	26%		Stable but inotropic therapy-dependent, In hosp or home	+ Arr + Frequent Flyer
INTERMACS 4	13%		<u>Resting symptoms</u> on oral therapy at home.	+ Arr + FF
INTERMACS 5	3%	REVIVE-IT	"Housebound", Comfortable at rest, symptoms with minimal daily activity	+ Arr + FF
INTERMACS 6	2%		"Walking wounded"- ADL possible but meaningful activity limited	+ Arr + FF
INTERMACS 7	1%		Advanced Class III	+ Arr

Clinical Decisions
For Support



Device
Or
Death

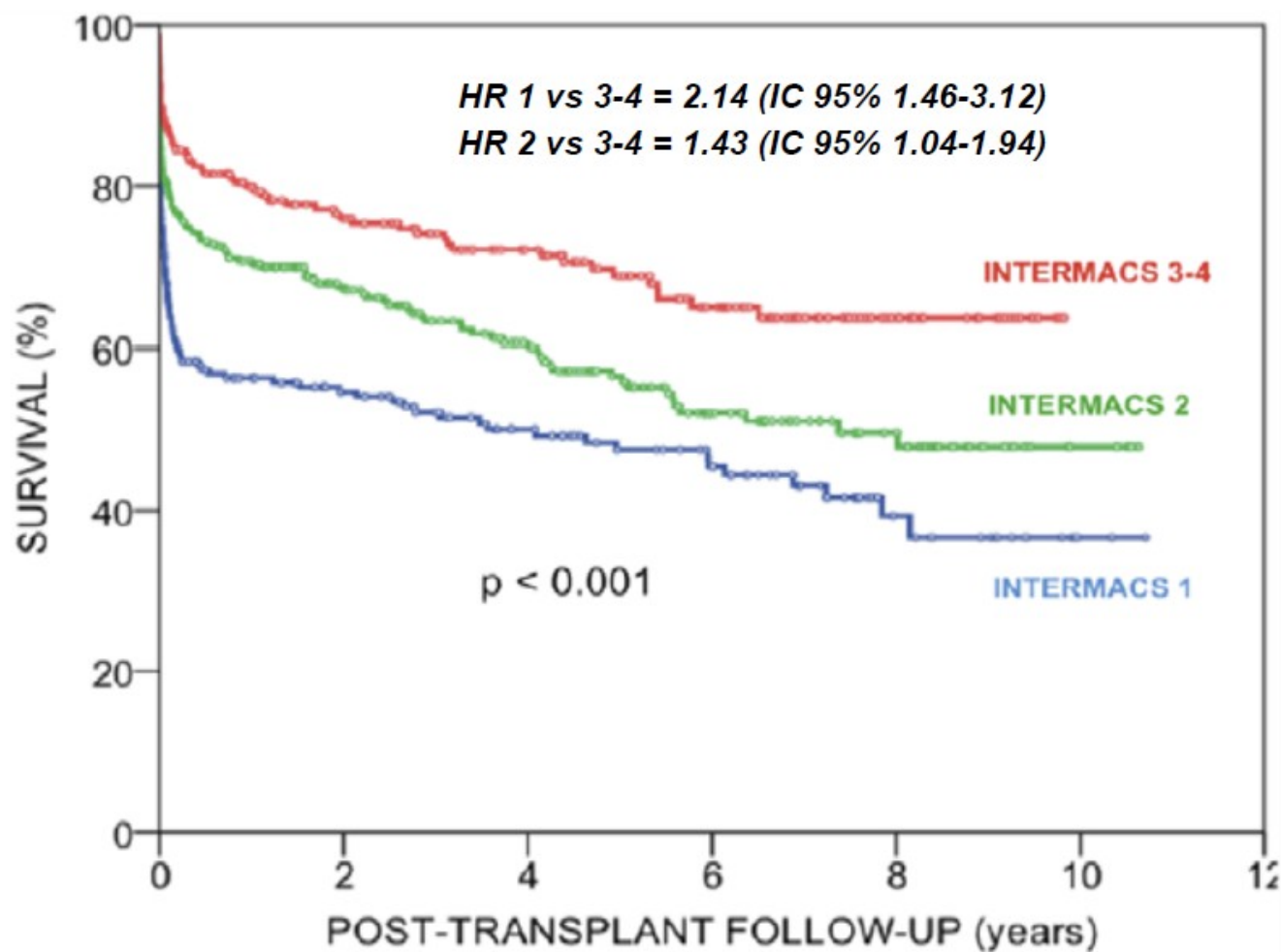


Beyond
survival:
function,
quality
outcomes
for
individualized
decisions



PERFILES INTERMACS Y TRASPLANTE

A



Patients at risk

	0	2	4	6	8	10
INTERMACS 1	207	89	63	44	14	2
INTERMACS 2	291	152	109	55	28	3
INTERMACS 3-4	206	127	96	59	22	0



ASISTENCIA CIRCULATORIA MECÁNICA

INDICACIONES

Bridge to decision (BTD)/ Bridge to bridge (BTB)	Use of short-term MCS (e.g. ECLS or ECMO) in patients with cardiogenic shock until haemodynamics and end-organ perfusion are stabilized, contra-indications for long-term MCS are excluded (brain damage after resuscitation) and additional therapeutic options including long-term VAD therapy or heart transplant can be evaluated.
Bridge to candidacy (BTC)	Use of MCS (usually LVAD) to improve end-organ function in order to make an ineligible patient eligible for heart transplantation.
Bridge to transplantation (BTT)	Use of MCS (LVAD or BiVAD) to keep patient alive who is otherwise at high risk of death before transplantation until a donor organ becomes available.
Bridge to recovery (BTR)	Use of MCS (typically LVAD) to keep patient alive until cardiac function recovers sufficiently to remove MCS.
Destination therapy (DT)	Long-term use of MCS (LVAD) as an alternative to transplantation in patients with end-stage HF ineligible for transplantation or long-term waiting for heart transplantation.



EUROPEAN
SOCIETY OF
CARDIOLOGY

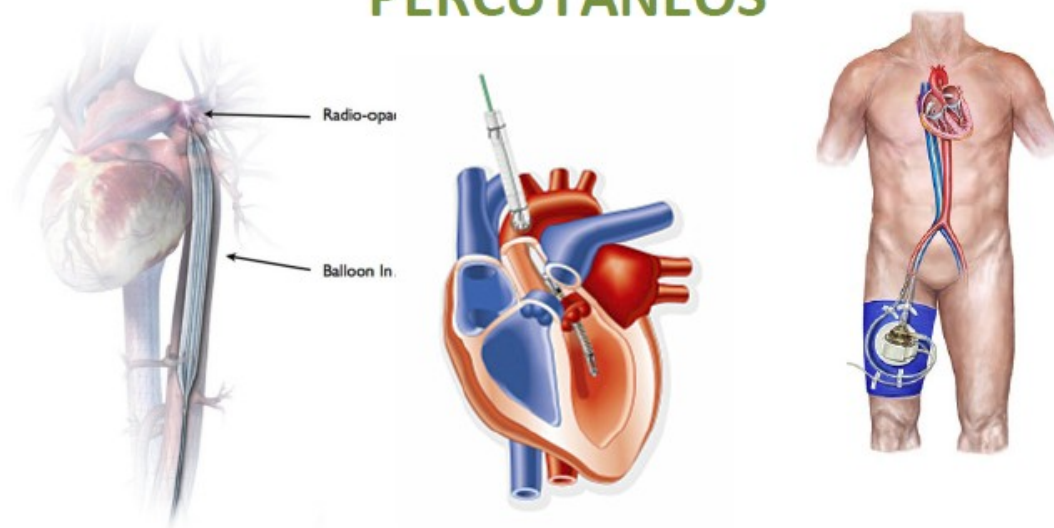




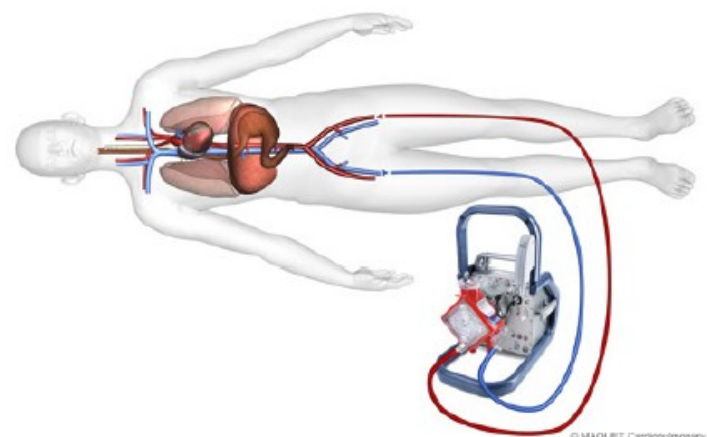
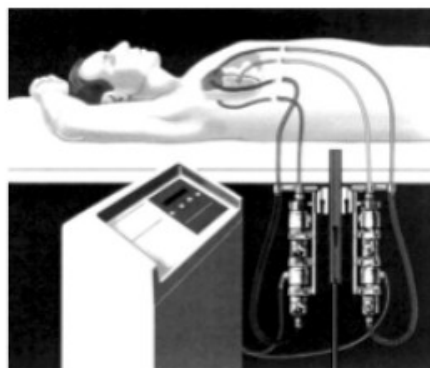
ASISTENCIA CIRCULATORIA MECÁNICA DISPOSITIVOS CORTA DURACIÓN

- ✓ INTERMACS 1-2
- ✓ Uso intrahospitalario
- ✓ < 30 días
- ✓ Puente a decisión ó recuperación
- ✓ Puente a TC urgente (España)

PERCUTÁNEOS



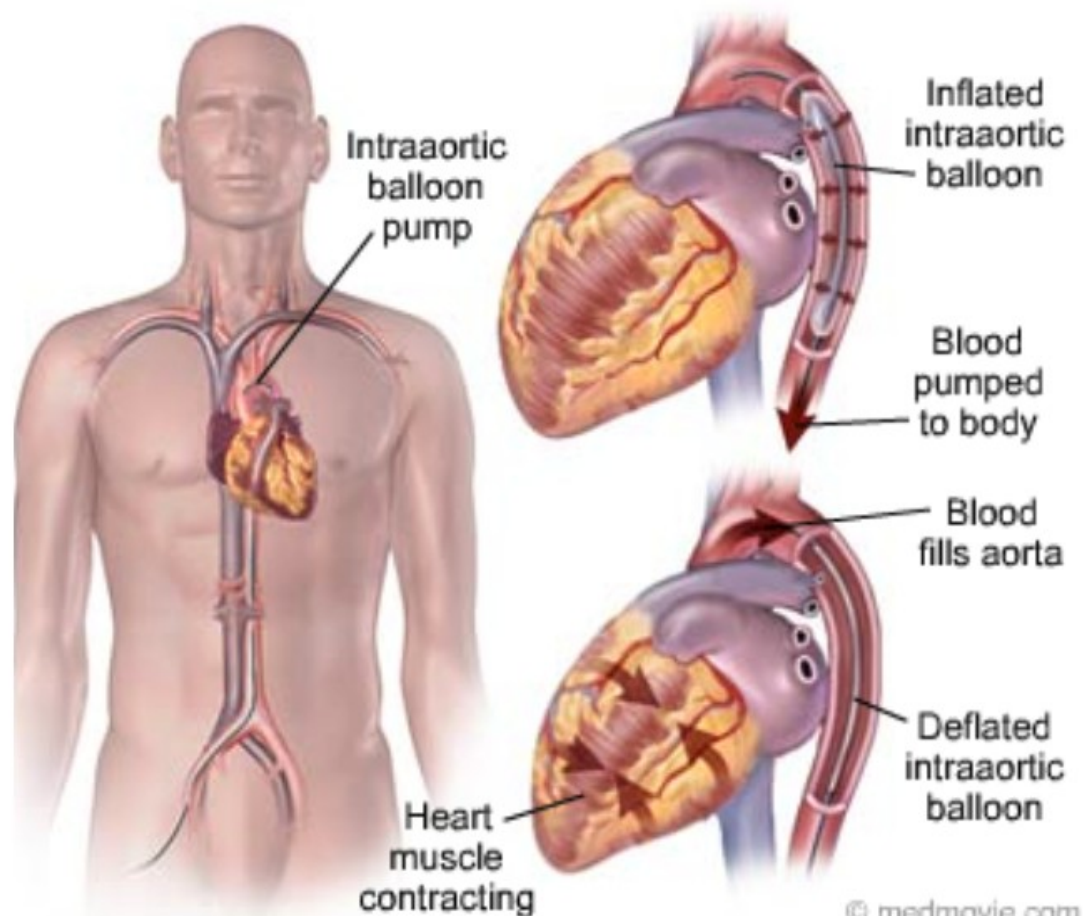
QUIRÚRGICOS



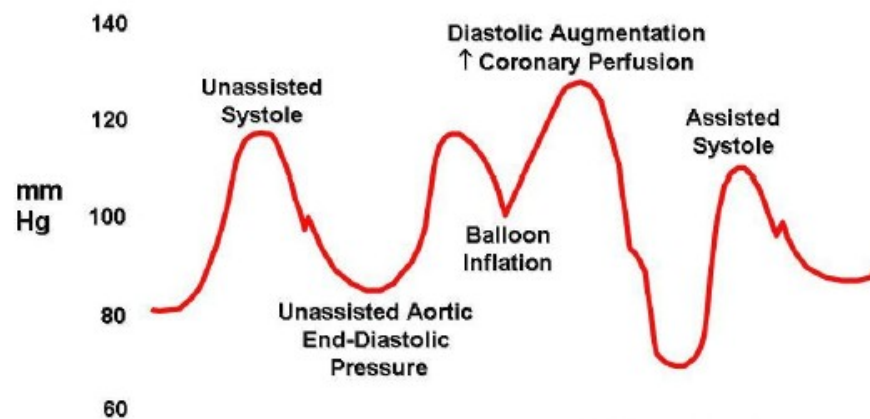
ECMO V-A



BALÓN DE CONTRAPULSACIÓN



© medmovie.com



↑ PERFUSIÓN CORONARIA

↓ POSTCARGA VI

↑ GASTO CARDIACO

↓ DAÑO ÓRGANOS DIANA

↓ RIESGO ARRÍTMICO



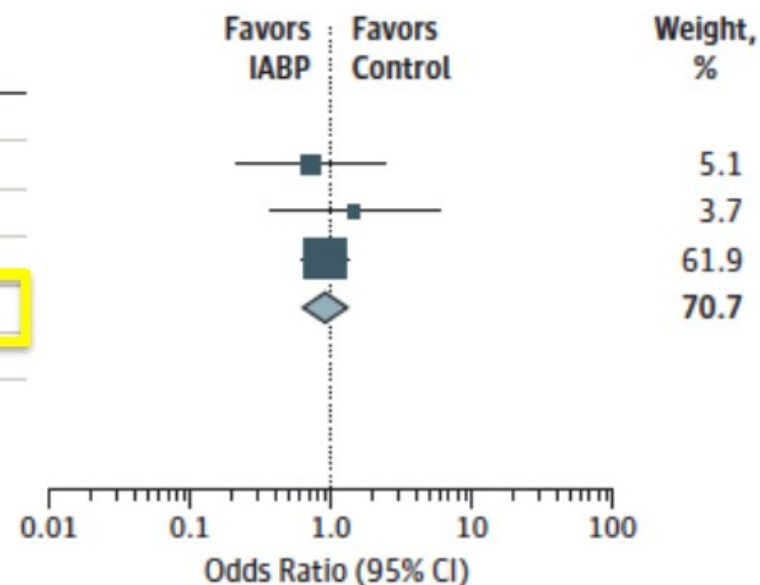
BALÓN DE CONTRAPULSACIÓN

Intra-aortic Balloon Pump Therapy for Acute Myocardial Infarction A Meta-analysis

Study or Subgroup	IABP		Control		Odds Ratio (95% CI)
	Events	Total	Events	Total	
Cardiogenic shock					
Ohman et al, ¹⁸ 2005	8	30	9	27	0.73 (0.23-2.27)
Prondzinsky et al, ¹⁹ 2010	7	19	6	21	1.46 (0.39-5.51)
Thiele et al, ² 2012	119	300	123	298	0.94 (0.67-1.30)
Subtotal (95% CI)		349		346	0.94 (0.69-1.28)
Total events	134		138		

Heterogeneity: $\tau^2 = 0.00$; $\chi^2 = 0.62$, $df = 2$ ($P = .73$); $I^2 = 0\%$

Test for overall effect: $z = 0.39$ ($P = .69$)





BALÓN DE CONTRAPULSACIÓN



EUROPEAN
SOCIETY OF
CARDIOLOGY

IABP insertion should be considered in patients with haemodynamic instability/cardiogenic shock due to mechanical complications.	IIa	C	
Routine use of IABP in patients with cardiogenic shock is not recommended.	III	A	332,333

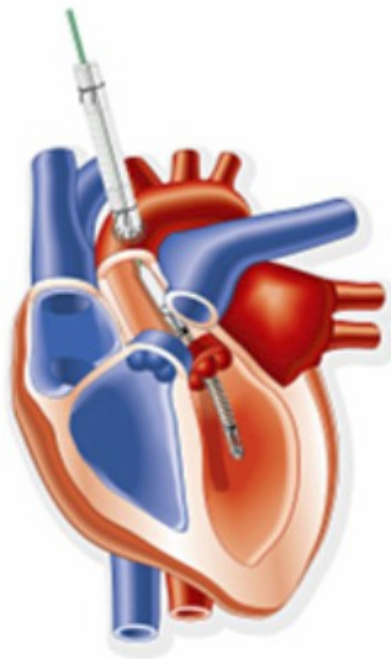




SOPORTE CIRCULATORIO DE CORTA DURACIÓN

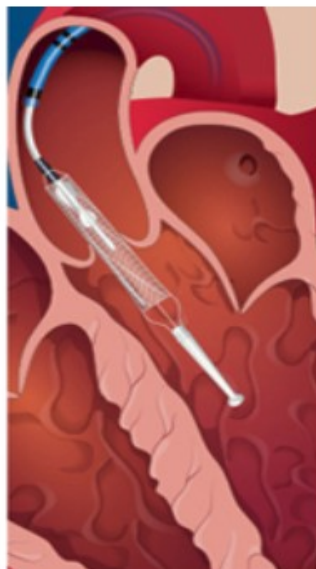
DISPOSITIVOS PERCUTÁNEOS

IMPELLA



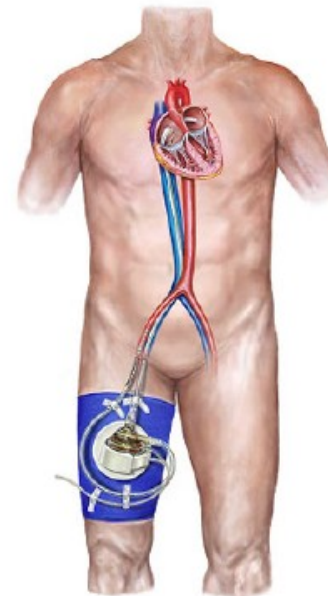
- ✓ IMPELLA 2.5L, 5L, CP y RV (?)
- ✓ Flujo 2,5-5 lpm (3-4 lpm)
- ✓ ICP alto riesgo y shock
- ✓ < 5 días
- ✓ Arteria femoral ó axilar
- ✓ Flujo continuo (axial)

THORATEC PHP



- ✓ Flujo 3-4 lpm
- ✓ ICP alto riesgo
- ✓ < 6 horas (<72 horas)
- ✓ Arteria femoral ó subclavia
- ✓ Flujo continuo (axial)

TANDEM HEART



- ✓ Flujo 4-5 lpm
- ✓ ICP alto riesgo y shock
- ✓ <14 días
- ✓ Vena y arterial femoral
- ✓ Flujo continuo (centrífuga)



SOPORTE CIRCULATORIO CORTA DURACIÓN

DISPOSITIVOS PERCUTÁNEOS

Percutaneous left ventricular assist devices vs. intra-aortic balloon pump counterpulsation for treatment of cardiogenic shock: a meta-analysis of controlled trials

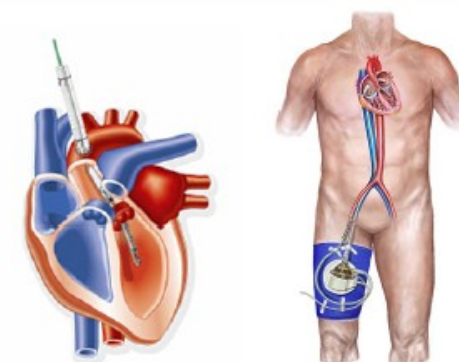


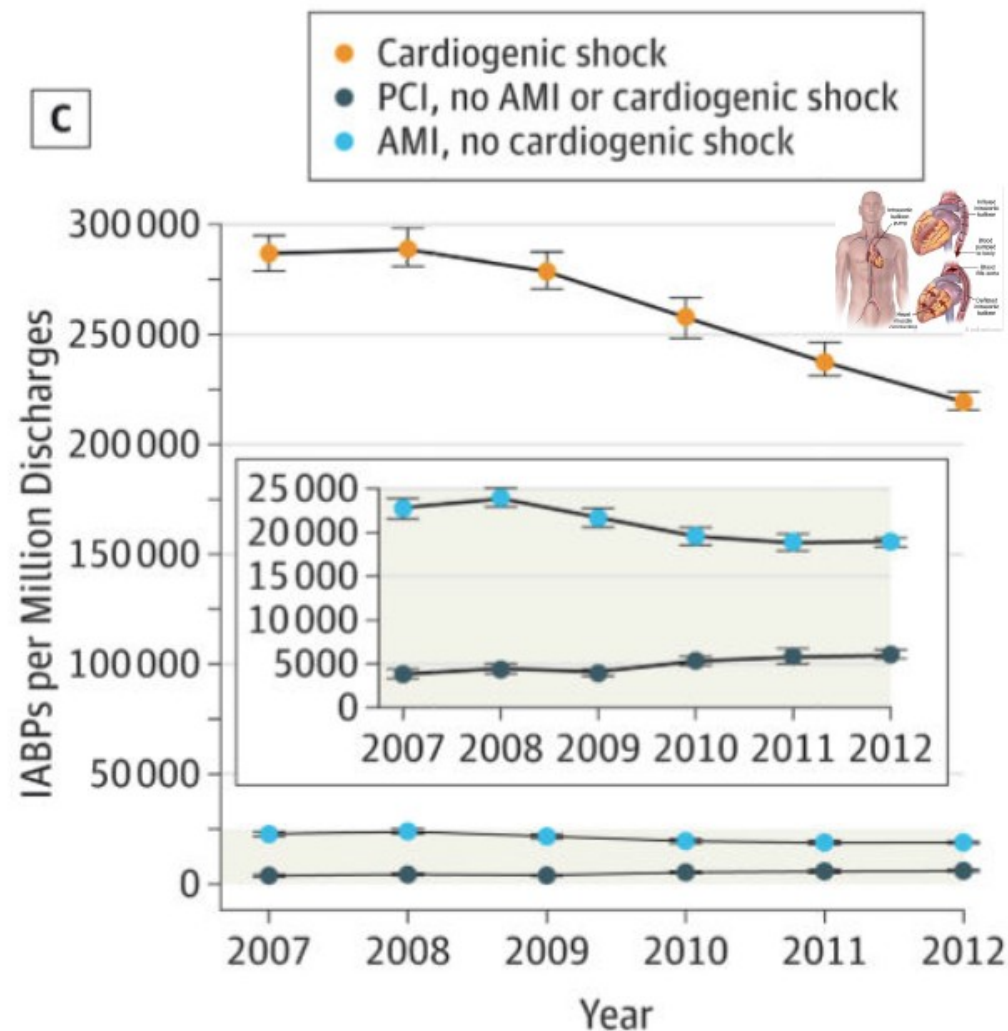
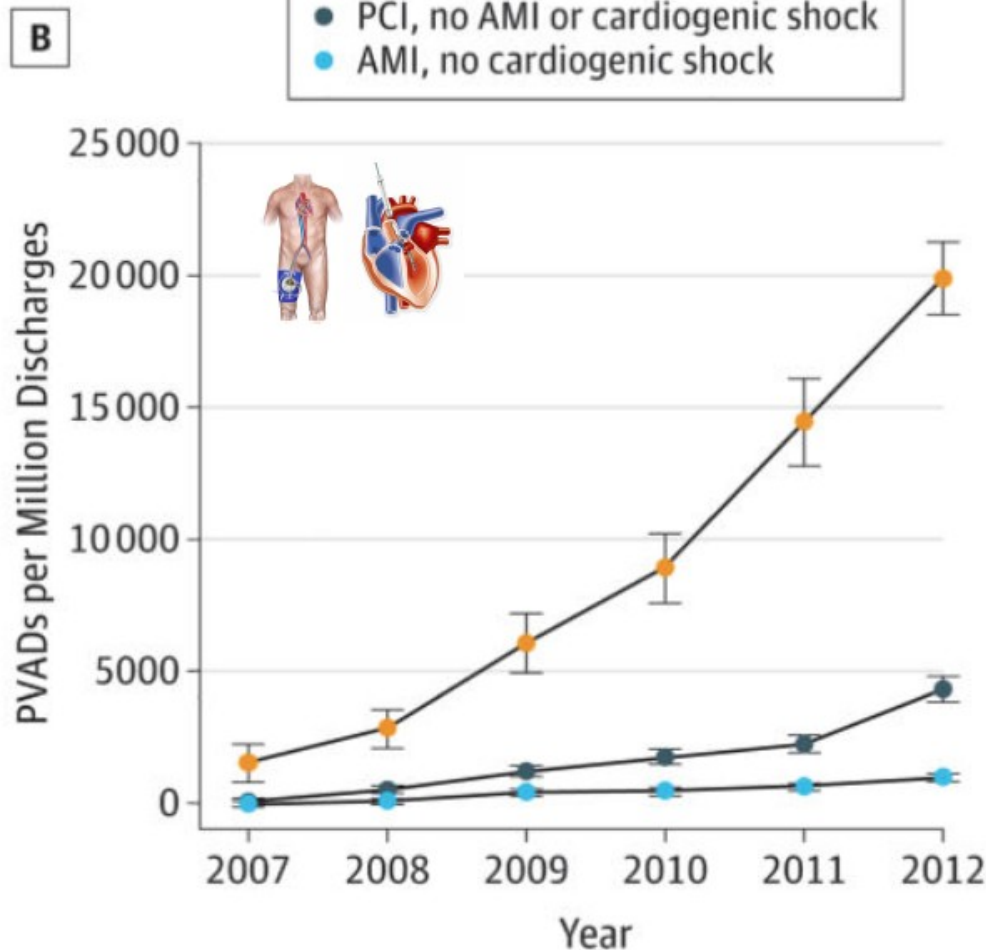
Table 3 Meta-analysis of outcomes

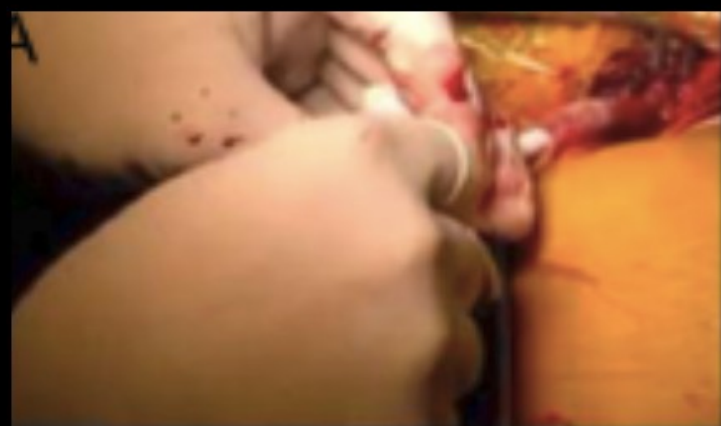
	Thiele et al. ¹⁶ TH		Burkhoff et al. ¹⁷ TH		Seyfarth et al. ¹⁸ IP 2.5		Pooled (fixed effect model)		Pooled (random effects model)	
	LVAD (n = 21)	IABP (n = 20)	LVAD (n = 19)	IABP (n = 14)	LVAD (n = 13)	IABP (n = 13)	Mean difference/ relative risk	P-value	Mean difference/ relative risk	P-value
Haemodynamics										
CI $\pm$ SD (L/min/m ²)	2.3 $\pm$ 0.6	1.8 $\pm$ 0.4	2.2 $\pm$ 0.6	2.1 $\pm$ 0.2	2.2 $\pm$ 0.6	1.8 $\pm$ 0.7	0.35 (0.14; 0.55)	<0.001	0.35 (0.09; 0.61)	<0.01
MAP $\pm$ SD (mmHg)	76 $\pm$ 10	70 $\pm$ 16	91 $\pm$ 16	72 $\pm$ 12	87 $\pm$ 18	71 $\pm$ 22	12.1 (6.3; 17.9)	<0.001	12.8 (3.6; 22.0)	<0.01
PCWP $\pm$ SD (mmHg)	16 $\pm$ 5	22 $\pm$ 7	16 $\pm$ 4	25 $\pm$ 3	19 $\pm$ 5	20 $\pm$ 6	-6.2 (-8.0; -4.3)	<0.001	-5.3 (-9.4; -1.2)	<0.05
Clinical outcome										
30-day mortality, n (%)	9 (43)	9 (45)	9 (47)	5 (36)	6 (46)	6 (46)	1.06 (0.68; 1.66)	0.80	1.06 (0.68; 1.66)	0.80
Reported adverse events										
Leg ischaemia, n (%)	7 (33)	0 (0)	4 (21)	2 (14)	1 (8)	0 (0)	2.59 (0.75; 8.97)	0.13	2.59 (0.75; 8.97)	0.13
Bleeding, n (%)	19 (90)	8 (40)	8 (42)	2 (14)			2.35 (1.40; 3.93)	<0.01	2.35 (1.40; 3.93)	<0.01
Fever of sepsis, n (%)	17 (81)	10 (50)	4 (21)	5 (36)			1.38 (0.88; 2.15)	0.16	1.11 (0.43; 2.90)	0.83

CI, cardiac index; IABP, intra-aortic balloon pump; LVAD, left ventricular assist device; MAP, mean arterial pressure; PCWP, pulmonary capillary wedge pressure.



SOPORTE CIRCULATORIO CORTA DURACIÓN DISPOSITIVOS PERCUTÁNEOS





IMPELLA CP TRANSAXILAR

Couto D. Rev Esp Cardiol 2017



SOPORTE CIRCULATORIO DE CORTA DURACIÓN IMPELLA CP TRANSAXILAR

Tabla

Pacientes asistidos con Impella CP como puente al trasplante cardiaco

N	Sexo/edad (años)	Enfermedad cardiológica	Perfil INTERMACS al implante	Días de asistencia	INTERMACS en el momento del TxC	Horas de VM después del TxC	Estancia en UCI después del TxC (días)	Días hasta el alta después del TxC	Complicaciones	Tiempo de seguimiento después del TxC (días)
1	Varón/65	MCD idiopática	2	20	3	11	6	30	Taponamiento cardiaco	405
2	Varón/68	Cardiopatía isquémica	1	6	3	72	9	44	Ictus isquémico	420
3	Varón/55	MCD idiopática	2	13	3	96	12	29	No	322
4	Varón/56	Miocarditis eosinofílica	2	14	3	12	4	17	No	161

MCD: miocardiopatía dilatada; TxC: trasplante cardiaco; UCI: unidad de cuidados intensivos; VM: ventilación mecánica.

N = 11 (2016-2018)

10/11 successfully bridged to HTx → All survived HTx

1/11 converted to VA-ECMO and then bridged to HTx → Died after HTx

Post-HTx survival of LVAD-bridged **100%**

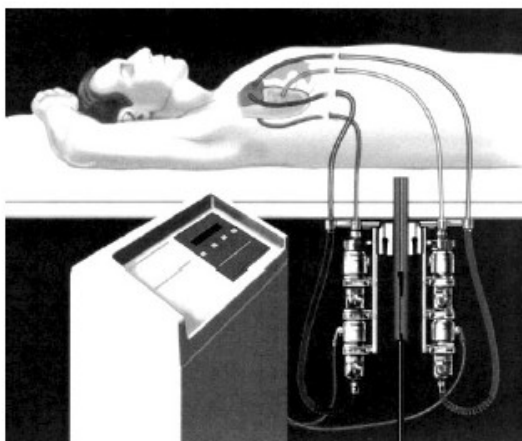
Overall survival **91%**





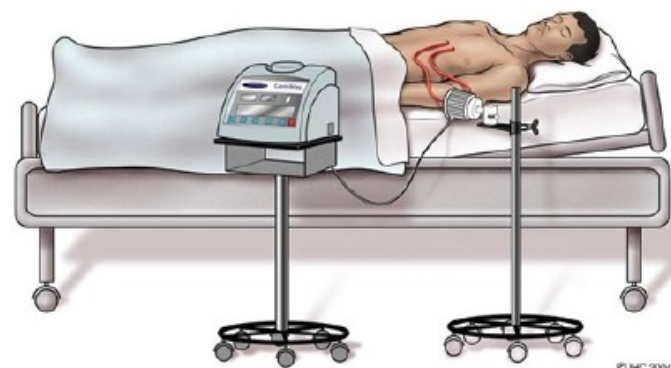
SOPORTE CIRCULATORIO DE CORTA DURACIÓN DISPOSITIVOS DE INSERCIÓN QUIRÚRGICA

ABIOMED BVS 5000



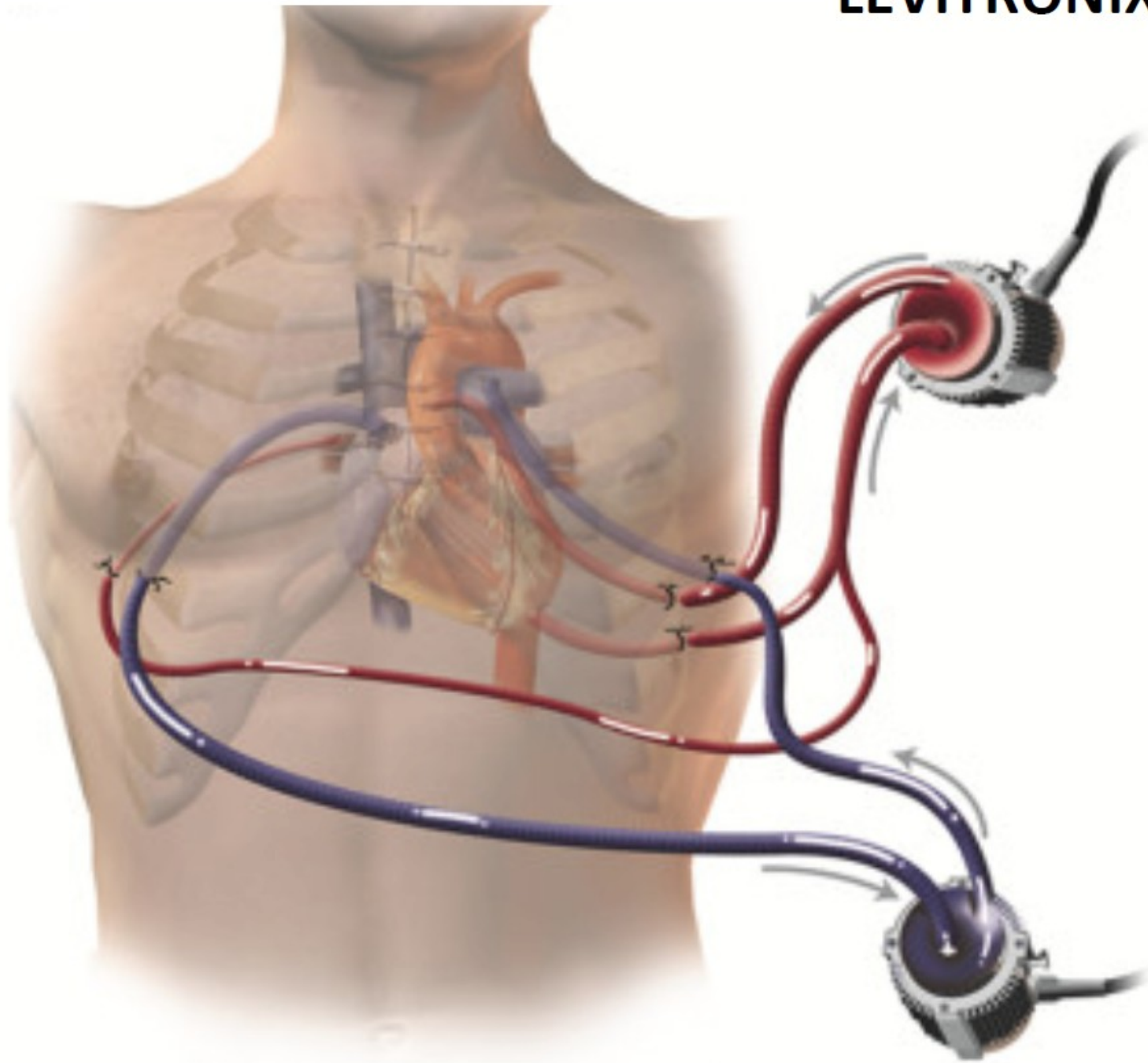
- ✓ Flujo pulsátil
- ✓ Flujo 5-6 lpm
- ✓ Soporte <28 días (>90 días)
- ✓ Uni ó biventricular
- ✓ Shock cardiogénico
- ✓ Anticoagulación con heparina iv
- ✓ Hemólisis, trombosis, hemorragia

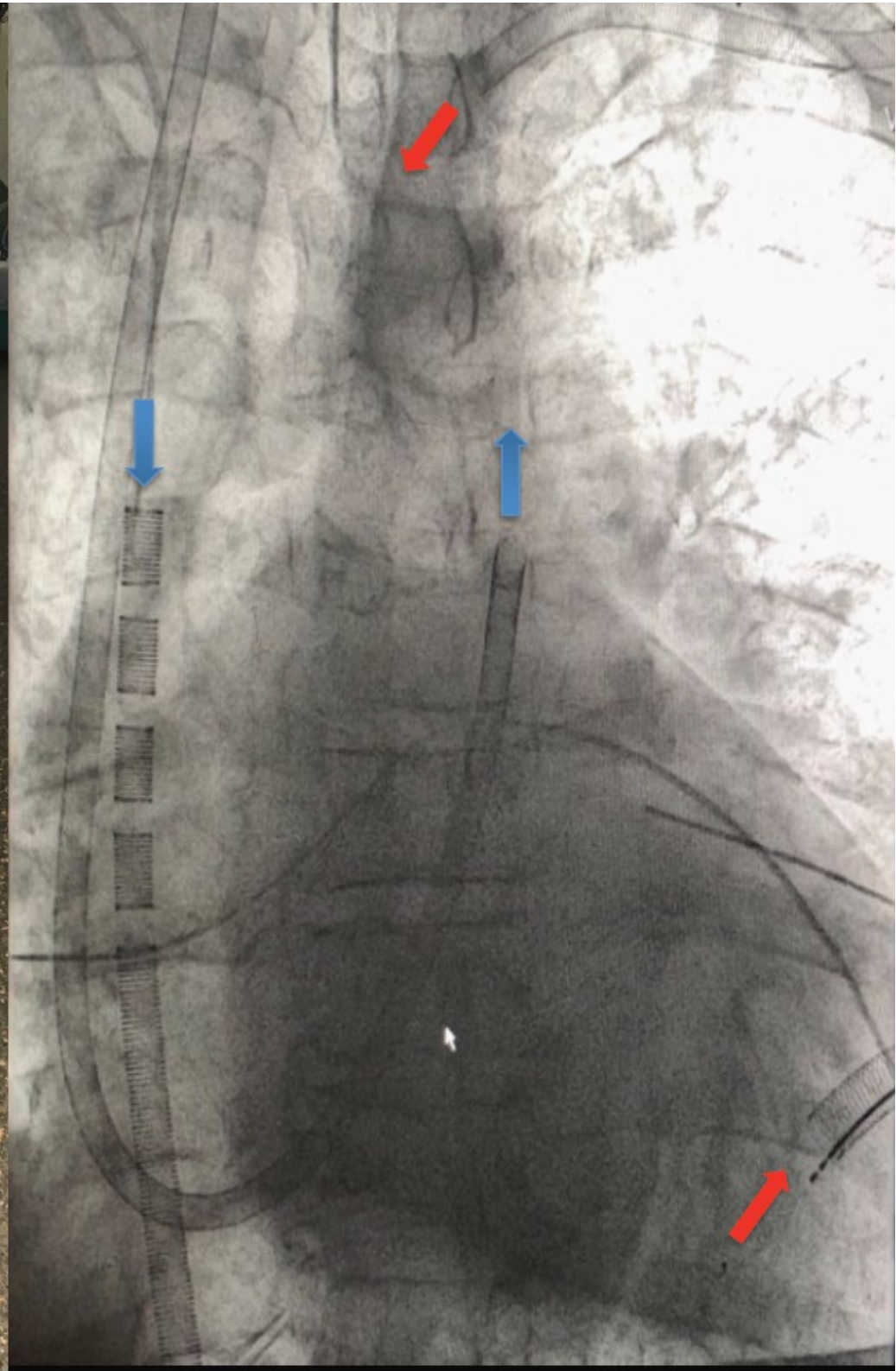
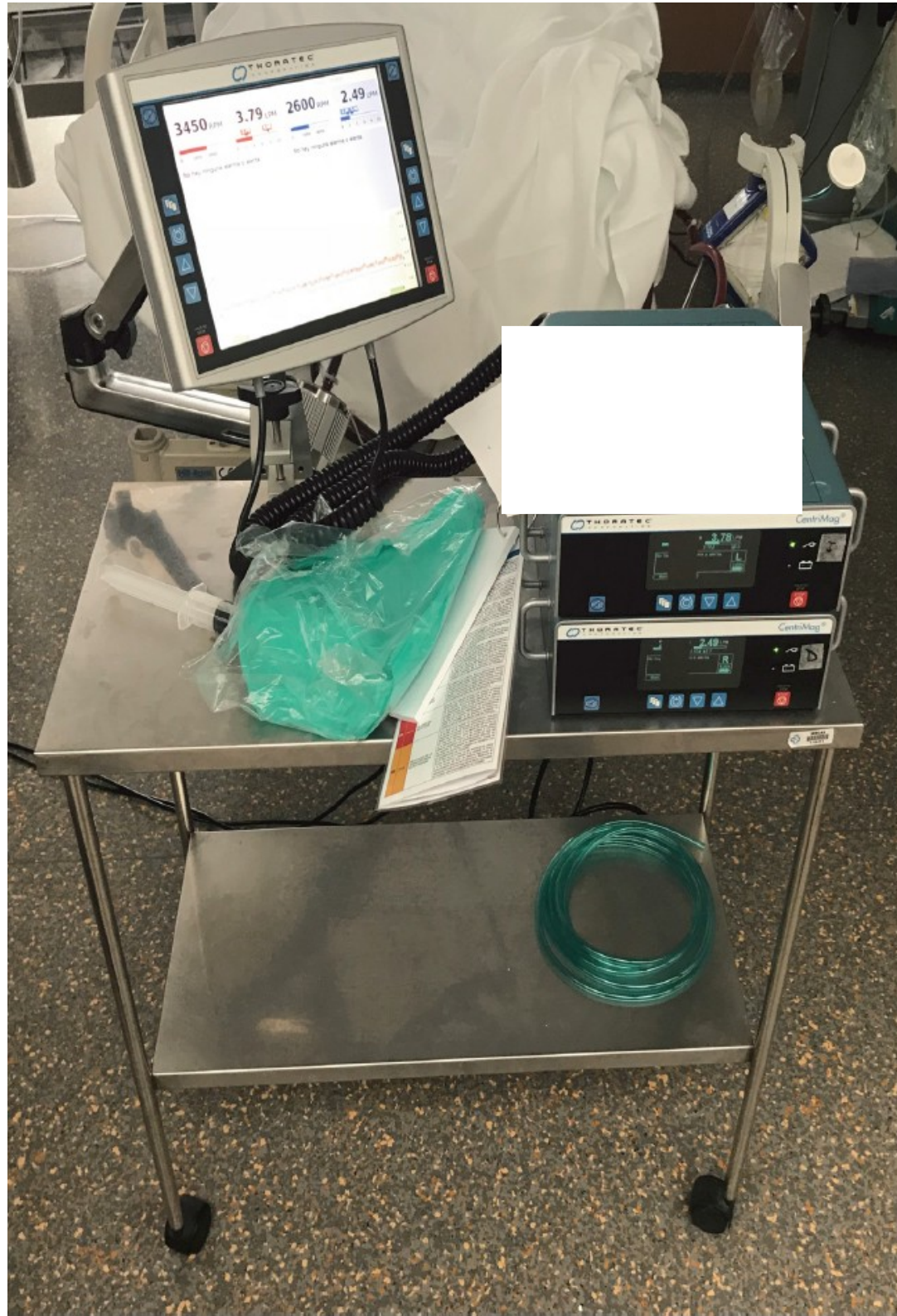
LEVITRONIX CENTRIMAG



- ✓ Flujo continuo (centrífuga)
- ✓ Flujo 5-6 lpm
- ✓ Soporte <28 días (>180 días)
- ✓ Uni ó biventricular
- ✓ Shock cardiogénico
- ✓ Anticoagulación con heparina iv
- ✓ Bajo riesgo de hemólisis y trombosis

LEVITRONIX CENTRIMAG





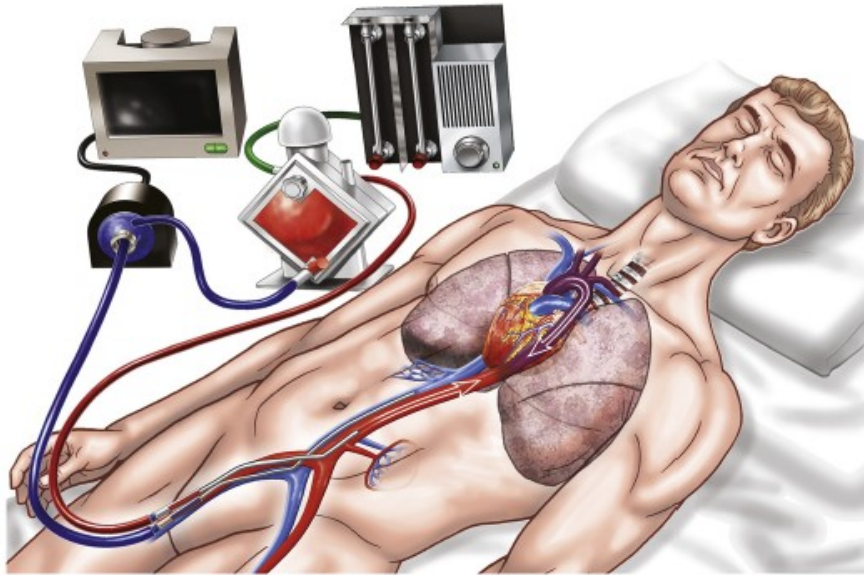


Thoratec CentriMag for Temporary Treatment of Refractory Cardiogenic Shock or Severe Cardiopulmonary Insufficiency: A Systematic Literature Review and Meta-Analysis of Observational Studies



Indication	N Studies (n pts)	On Support	N Studies (n pts)	At Discharge	N Studies (n pts)	30-day
VAD support in precardiotomy cardiogenic shock	5 (45)	82% (70–92%)	3 (23)	66% (45–83%)	6 (69)	66% (54–76%)
VAD support in postcardiac surgery cardiogenic shock indication	4 (32)	63% (46–78%)	6 (32)	53% (35–69%)	5 (65)	41% (30–54%)
VAD support in post-transplant graft rejection or failure indication	3 (40)	62% (46–76%)	2 (12)	71% (43–92%)	3 (45)	54% (39–68%)
VAD support in post-LVAD placement right ventricular failure indication	6 (58)	83% (73–92%)	4 (54)	62% (49–75%)	3 (41)	61% (46–75%)

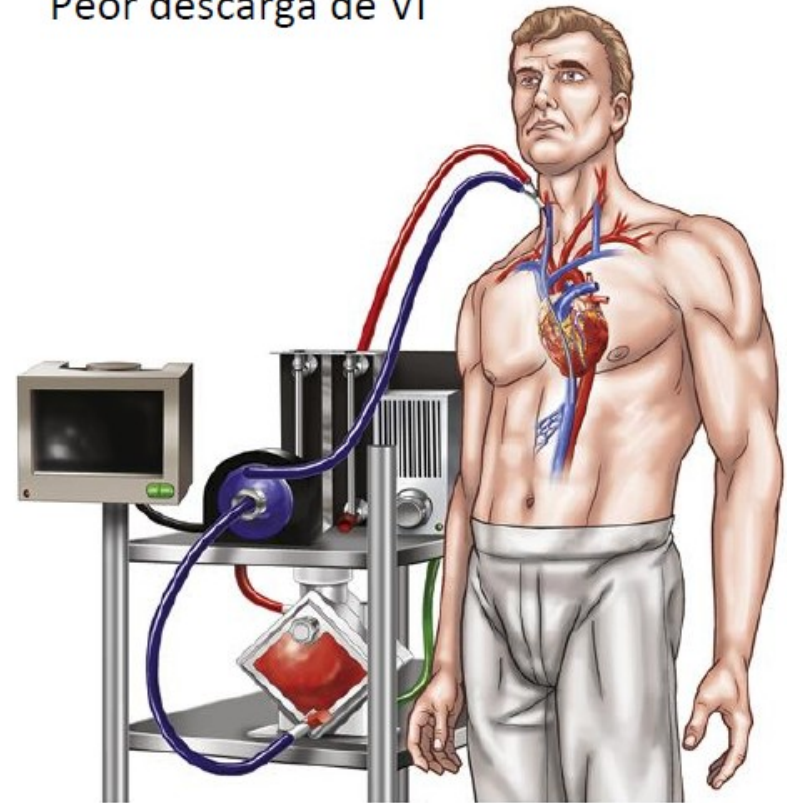
ECMO VENO-ARTERIAL



- Flujo continuo 4-5 lpm
- CV 21-24 F / CA 15-19 F
- Percutáneo ó quirúrgico
- Hasta 2 semanas
- Peor descarga de VI



CARDIOHELP





SOPORTE CIRCULATORIO DE CORTA DURACIÓN

ECMO VENO-ARTERIAL

Venoarterial Extracorporeal Membrane Oxygenation for Cardiogenic Shock and Cardiac Arrest: A Meta-Analysis

- N = 1199
- 22 registros
- 40% PCR

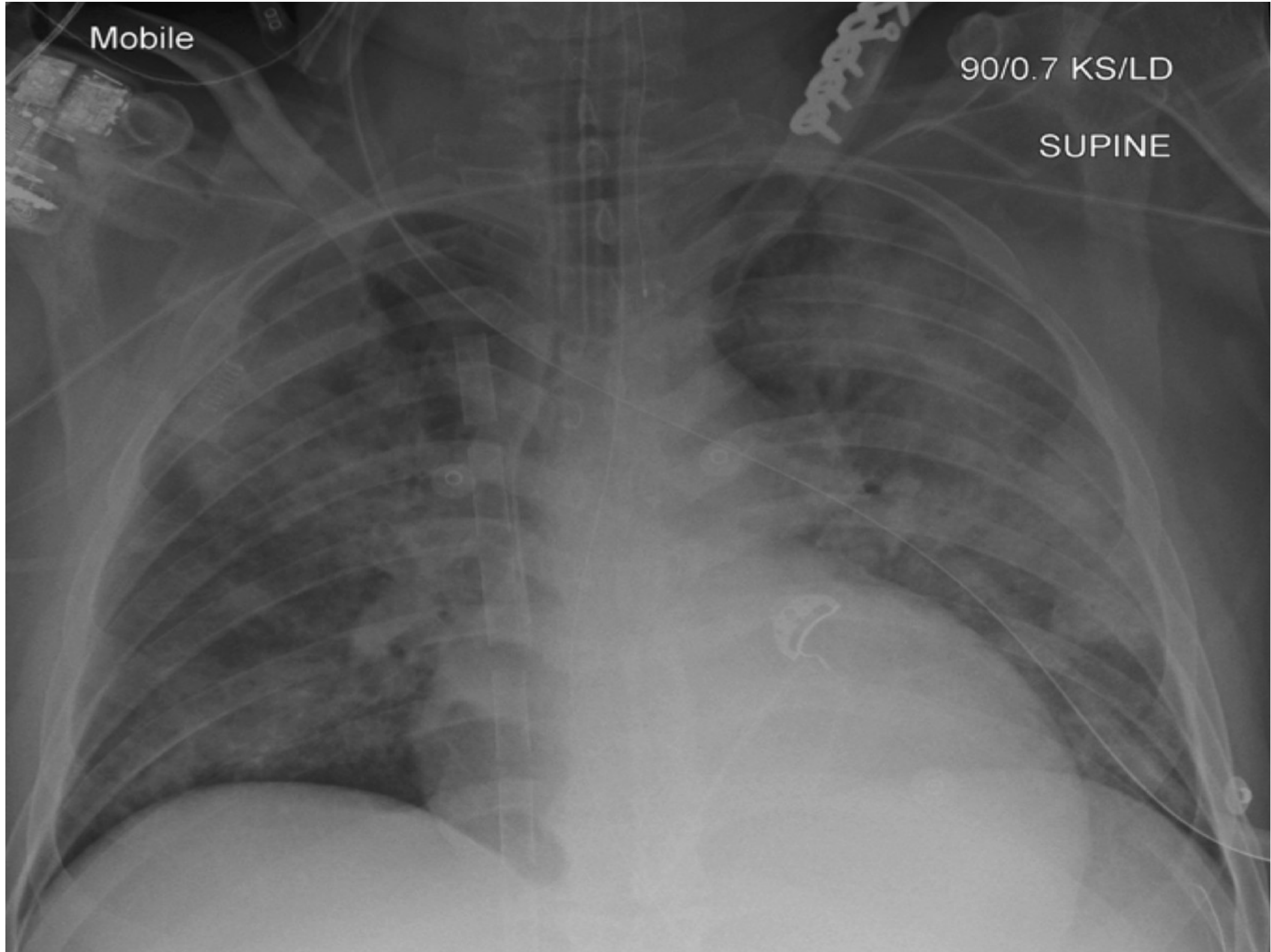
	Length of Hospital Stay (d)	Weaned Successfully (%)	Survival to Discharge (%)	30-Day Survival (%)	3-Month Survival (%)	6-Month Survival (%)	1-Year Survival (%)	Bridge to VAD (%)	Bridge to HTx (%)
Cumulative complication rate	—	587/1104	340/841	366/681	36/64	99/236	178/360	53/462	39/513
p value heterogeneity	0.007	<0.001	<0.001	<0.001	0.290	<0.001	<0.001	<0.001	0.576
I-squared (%)	64	74	70	80	19	92	91	88	0
Weighted pooled proportion or estimate	23.9	52.5	40.2	52.8	55.9	47.6	54.4	14	7.2
95% Confidence interval (%)	20.2-27.6	46.4-58.5	33.9-46.7	43.9-61.6	41.5-69.8	25.4-70.2	36.6-71.7	5.5-25.3	5-9.7

Complication	Number of Studies Reported	Events/Total	Weighted Pooled Estimate Rate (%)	95% Confidence Interval (%)	Heterogeneity	
					I ²	p value
Lower limb ischemia	16	96/842	10.7	8.1-13.5	31	0.114
Lower limb fasciotomy	4	17/179	9.2	5.2-14.1	0	0.790
Lower limb amputation	6	9/268	2.9	1.0-5.6	2	0.393
Stroke	7	39/389	7.8	3.3-13.6	64	0.007
Neurologic complications (total)	14	98/758	12.4	7.4-18.4	79	<0.001
AKI	9	206/419	47.4	30.2-64.9	92	<0.001
Renal dialysis	14	312/839	35.2	23-47.4	95	<0.001
Major bleeding/tamponade	6	67/179	25.8	5.8-52.7	92	<0.001
Reoperation for bleeding	4	70/224	30.3	1.8-72.2	98	<0.001
Infection	11	126/515	25.1	15.9-35.5	84	<0.001
Thrombus	4	14/247	4.5	0.3-8.6	62	0.032

Mobile

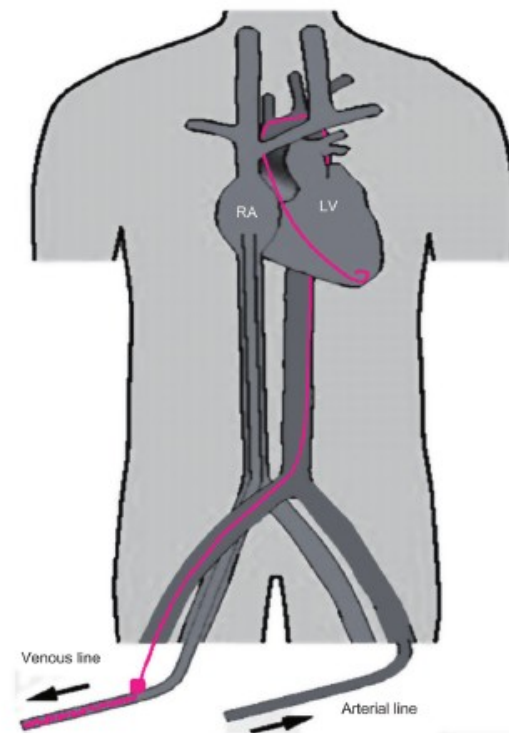
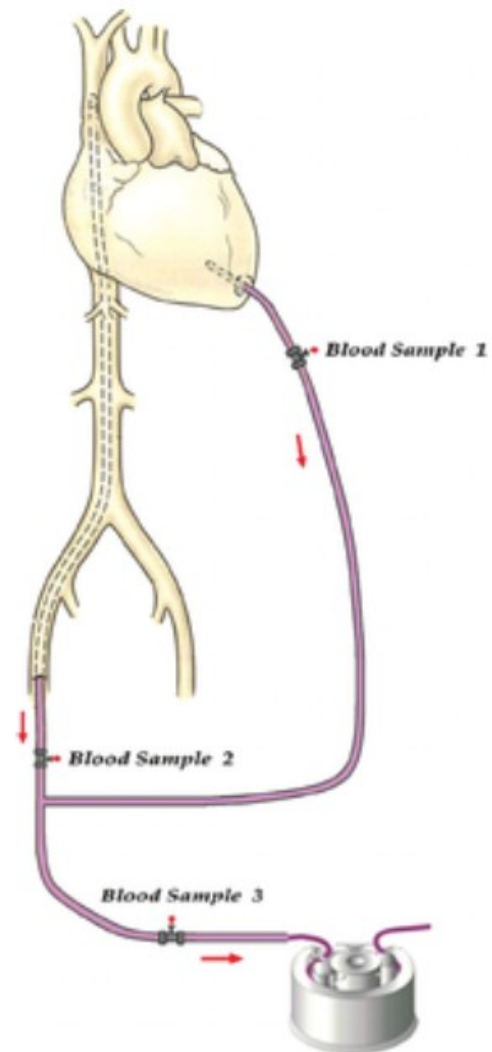
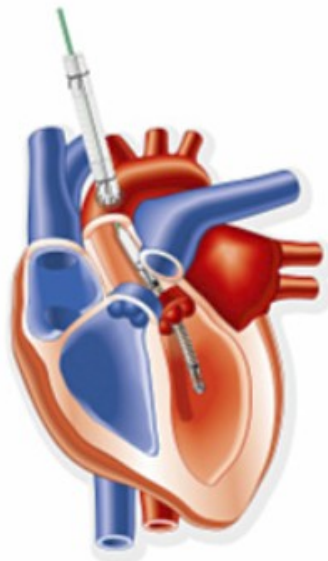
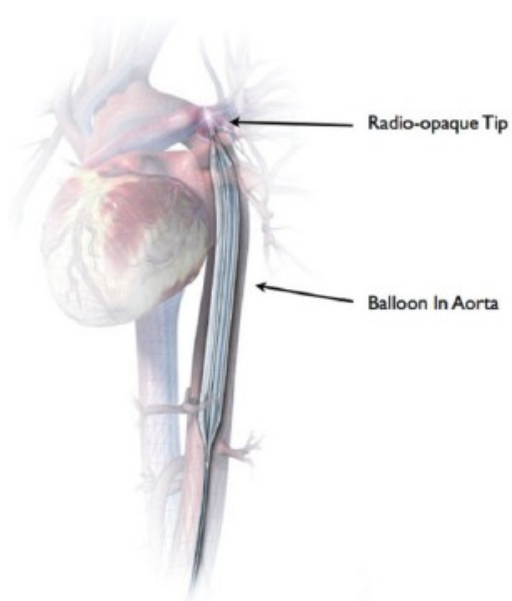
90/0.7 KS/LD

SUPINE



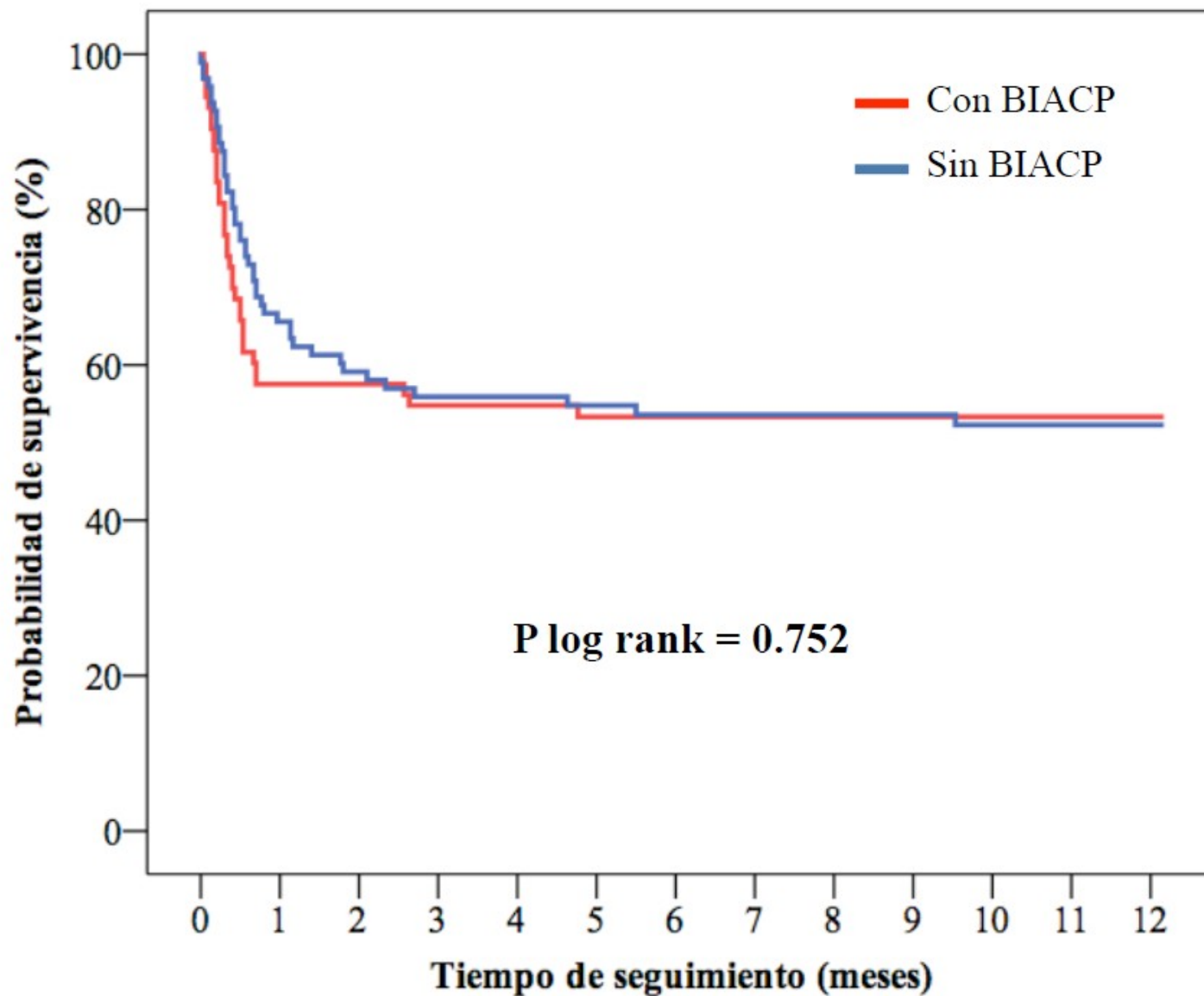


ECMO VENO-ARTERIAL DESCARGA VENTRICULAR IZQUIERDA

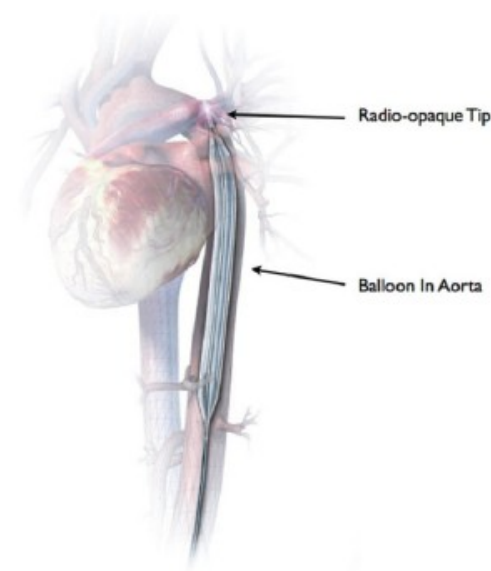




ECMO VENO-ARTERIAL BALÓN INTRAÓRTICO DE CONTRAPULSACIÓN

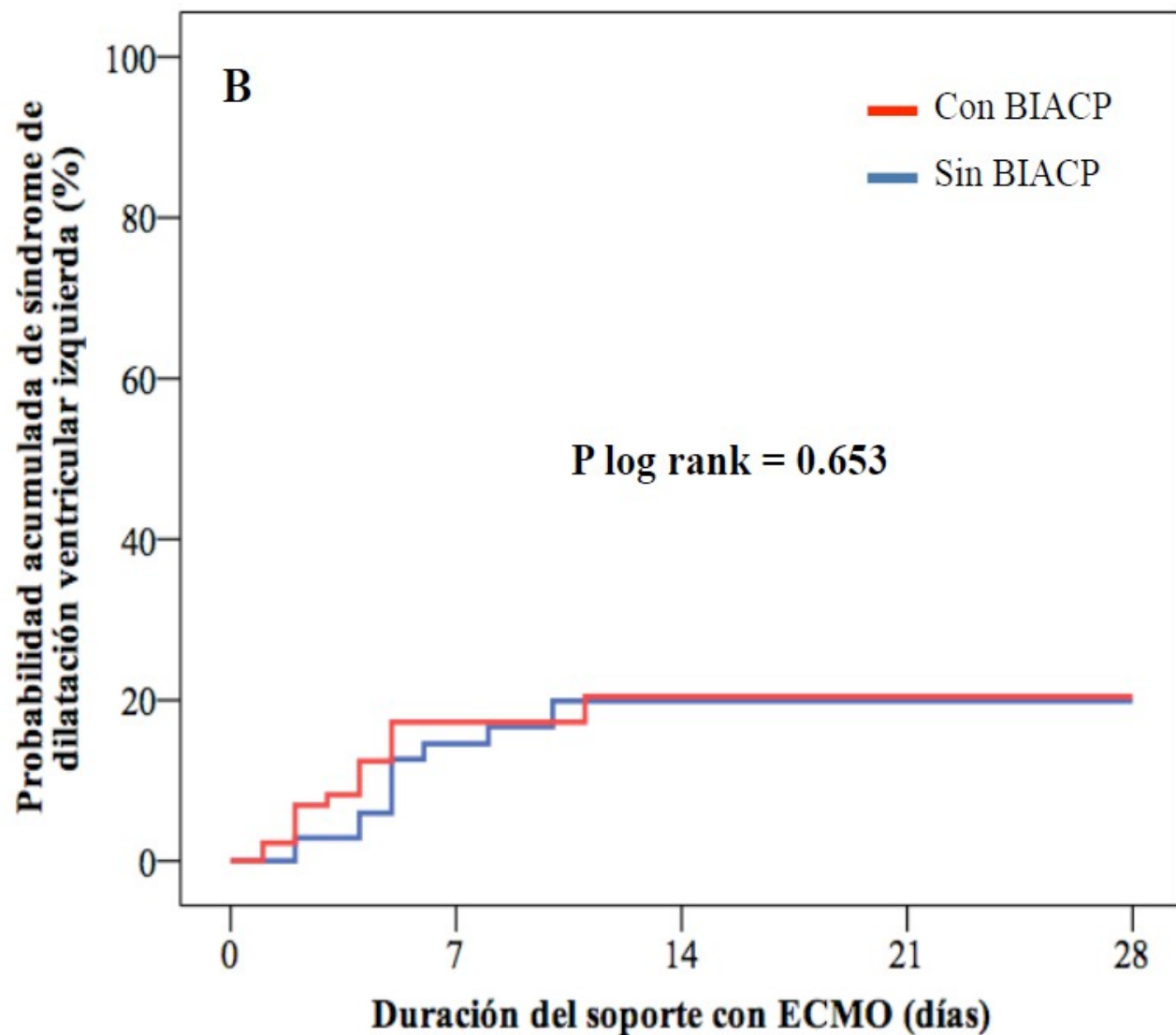


N = 169
16 centros españoles
2010-2015
43% BIACP
Todos puente TC

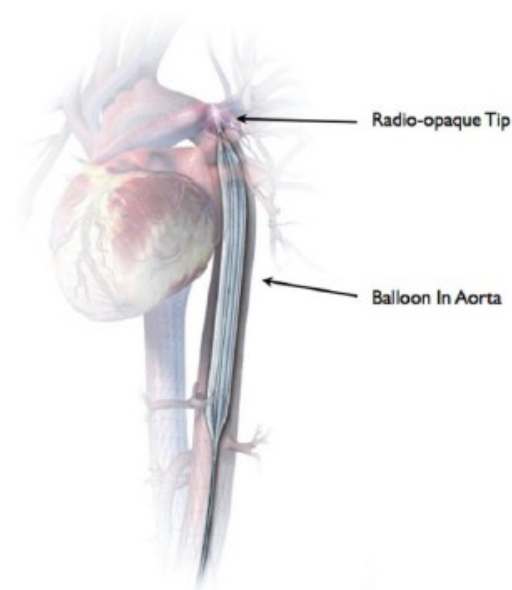




ECMO VENO-ARTERIAL BALÓN INTRAÓRTICO DE CONTRAPULSACIÓN



N = 169
16 centros españoles
2010-2015
43% BIACP
Todos puente TC





ASISTENCIA CIRCULATORIA MECÁNICA PUENTE AL TRASPLANTE URGENTE

Tabla

Criterios de prioridad para la distribución de donantes cardiacos en pacientes adultos en España en 2017



Urgencia grado 0 (nacional)^a

- Pacientes con asistencia ventricular completa de corta duración^b
- Pacientes que lleven un mínimo de 48 h en asistencia con oxigenador de membrana extracorpórea o asistencia ventricular parcial de corta duración que no presenten criterios de fallo multiorgánico^{c,d}
- Pacientes con asistencia ventricular de media/larga duración disfuncionante por tromboembolia o disfunción mecánica^e

Urgencia grado 1 (zonal)^f

- Pacientes con asistencia ventricular de media/larga duración externa normofuncionante^g
- Pacientes con asistencia ventricular de larga duración disfuncionante por infección de la línea, hemorragia digestiva o insuficiencia grave del ventrículo derecho^h

Grado de prioridad electivo

- Todos los demás candidatos a trasplante cardiaco que no cumplen criterios para incluirlos en urgencia grado 0 o grado 1





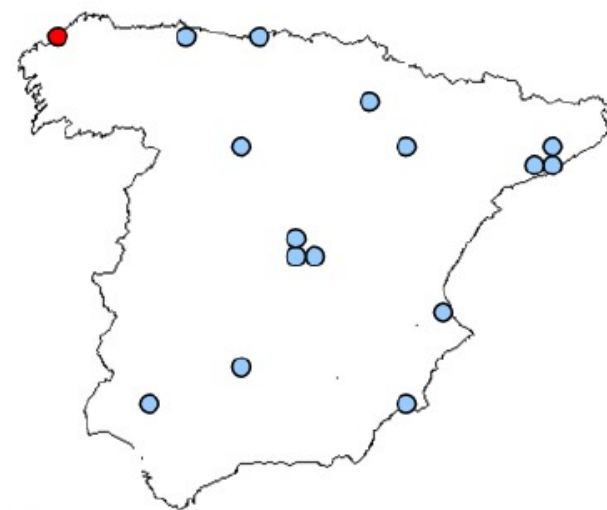
ESTUDIO ASIS-TC

BARGE CABALLERO; EDUARDO

► **Proyecto:** EMPLEO DE LOS DISPOSITIVOS DE ASISTENCIA CIRCULATORIA MECÁNICA DE CORTA DURACIÓN COMO PUENTE AL TRASPLANTE CARDIACO URGENTE EN ESPAÑA: EFICACIA, SEGURIDAD Y ANÁLISIS DE COSTES

► **Centro:** COMPLEJO HOSPITALARIO UNIVERSITARIO A CORUÑA (LA CORUÑA)

- ✓ Edad > 18 años
- ✓ 16 centros españoles
- ✓ Inclusión en LE Urgencia 0 ó 1 con:
 - A) MCS corta duración
 - VA-ECMO central o percutáneo
 - LVAD percutáneo
 - LVAD, BIVAD, RVAD pulsátil (ABIOMED AB 5000-like)
 - LVAD, BIVAD, RVAD continuo (LEVITRONIX-like)
 - B) BIACP
- ✓ No se consideran VAD de MEDIA y LARGA DURACIÓN (Excor-like ó HVAD-like)
- ✓ Inclusión: Enero de 2010 – Diciembre de 2015
- ✓ Recogida de Datos: Julio – Octubre de 2016.



*ciber***cv**

FUNDACIÓN
MUTUA MADRILEÑA
Nuestra forma de ser

Salud ► Ayudas a la Investigación



European Journal of Heart Failure (2017)
doi:10.1002/ejhf.956

RESEARCH ARTICLE

Clinical outcomes of temporary mechanical circulatory support as a direct bridge to heart transplantation: a nationwide Spanish registry

Eduardo Barge-Caballero^{1*}, Luis Almenar-Bonet², Francisco Gonzalez-Vilchez³, José L. Lambert-Rodríguez⁴, José González-Costello⁵, Javier Segovia-Cubero⁶, María A. Castel-Lavilla⁷, Juan Delgado-Jiménez⁸, Iris P. Garrido-Bravo⁹, Diego Rangel-Sousa¹⁰, Manuel Martínez-Sellés¹¹, Luis De la Fuente-Galan¹², Gregorio Rábago-Juan-Aracil¹³, Marisa Sanz-Julve¹⁴, Daniela Hervás-Sotomayor¹⁵, Sonia Mirabet-Pérez¹⁶, Javier Muñoz¹⁷, and María G. Crespo-Leiro¹

¹Complejo Hospitalario Universitario de A Coruña, A Coruña, Spain; ²Hospital Universitario y Politécnico La Fe, Valencia, Spain; ³Hospital Universitario Marqués de Valdecilla, Santander, Spain; ⁴Hospital Universitario Central de Asturias, Oviedo, Spain; ⁵Hospital Universitario de Bellvitge, Hospitalet de Llobregat, Spain; ⁶Hospital Universitario Puerta de Hierro, Madrid, Spain; ⁷Hospital Clinic i Provincial, Barcelona, Spain; ⁸Hospital Universitario Doce de Octubre, Madrid, Spain; ⁹Hospital Universitario Virgen de la Arrixaca, Murcia, Spain; ¹⁰Hospital Universitario Virgen del Rocío, Sevilla, Spain; ¹¹Hospital Universitario Gregorio Marañón, Universidad Complutense, Universidad Europea, Madrid, Spain; ¹²Hospital Clínico Universitario, Valladolid, Spain; ¹³Clinica Universidad de Navarra, Pamplona, Spain; ¹⁴Hospital Universitario Miguel Servet, Zaragoza, Spain; ¹⁵Hospital Universitario Reina Sofia, Córdoba, Spain; ¹⁶Hospital Santa Creu i Sant Pau, Barcelona, Spain; and ¹⁷Instituto Universitario de Ciencias de la Salud, Universidad de A Coruña (UDC), A Coruña, Spain



DISPOSITIVOS IMPLANTADOS

N = 291
LE Urgencia 0
2010-2015
16 CENTROS

7 T-BIVAD con VA-ECMO previo
5 T-LVAD con VA-ECMO previo
2 VA-ECMO con T-LVAD previo

Table 1 Devices in place at the time of high-urgent listing

Devices	Patients, n
VA-ECMO	169 (58%)
Peripheral insertion, femoral artery ^a	144
Peripheral insertion, other artery ^a	17
Central insertion ^b	8
T-LVAD	70 (24%)
Levitronix CentriMag ^b	51
Impella Recover ^a	12
Abiomed BVS 5000 ^c	6
Maquet Rotaflow ^b	1
T-BiVAD	52 (18%)
Levitronix CentriMag ^b	36
Abiomed BVS 5000 ^c	14
Abiomed AB 5000 ^c	1
Sorin Revolution ^b	1

DIAGRAMA DE FLUJO

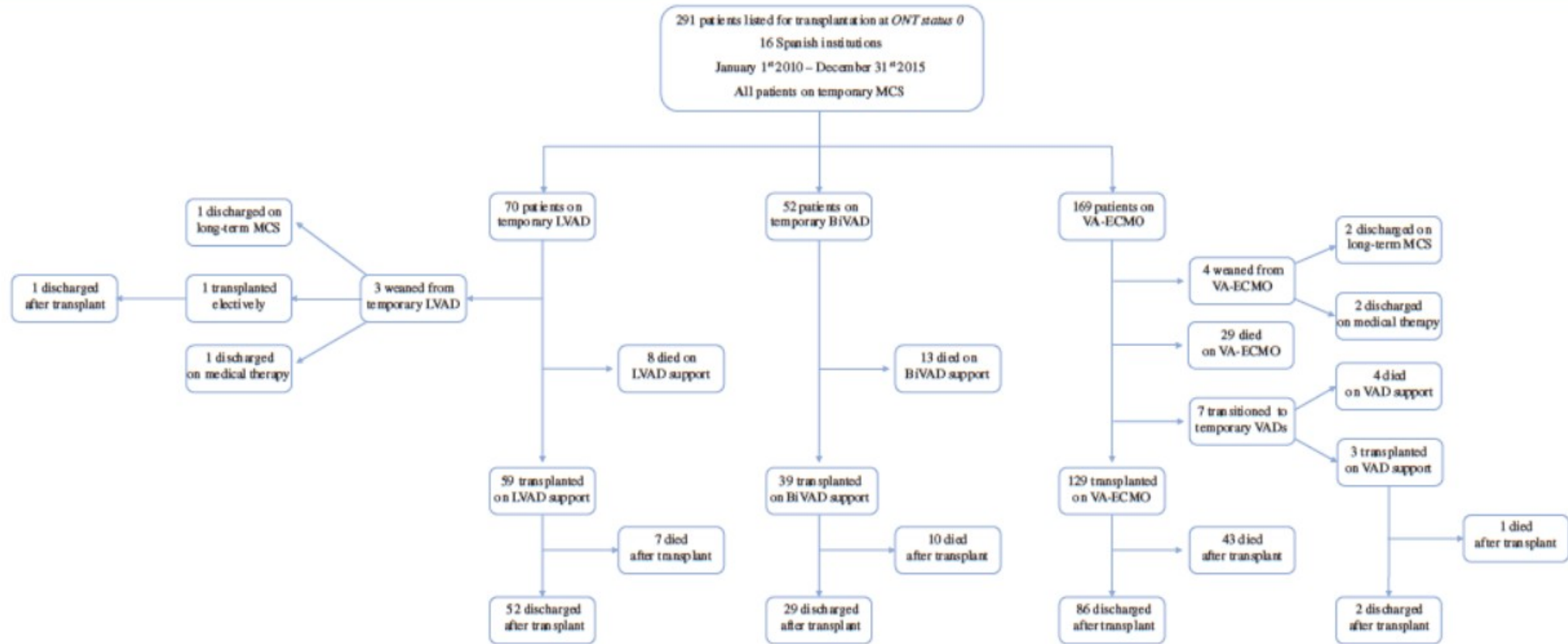


Figure 1 Flow chart of patients, devices and outcomes from high-urgent listing to hospital discharge. BiVAD, biventricular assist device; LVAD, left ventricular assist device; MCS, mechanical circulatory support; ONT, Organización Nacional de Trasplantes; VAD, ventricular assist device; VA-ECMO, veno-arterial extracorporeal membrane oxygenation.



CARACTERÍSTICAS BASALES

Table 2 Clinical characteristics of the study patients at the time of high-urgent listing

Variables	T-LVAD (n = 70)	T-BIVAD (n = 52)	VA-ECMO (n = 169)	P-value
Clinical history				
Age (years)	52 ± 12	52 ± 10	50 ± 13	0.517
Female sex	22.9%	23.1%	24.3%	0.967
Body mass index (kg/m ²)	25 ± 4	26 ± 4	26 ± 5	0.313
Days from hospital admission to device insertion	10 ± 15	14 ± 22	12 ± 20	0.440
Days from device insertion to high-urgent listing	11 ± 14	7 ± 9	3 ± 5	<0.001
Patients in waiting list prior to device insertion	28.6%	23.1%	27.8%	0.948
Ischaemic heart disease	61.4%	44.2%	53.3%	0.168
Cardiogenic shock related to acute myocardial infarction	47.1%	25.0%	32%	0.023
Cardiogenic shock following cardiac surgery	4.3%	13.5%	10.1%	0.194
Diabetes mellitus	15.7%	23.1%	25.4%	0.262
Hypertension	24.3%	34.6%	33.1%	0.344
Hypercholesterolaemia	30%	36.5%	33.1%	0.748
Previous open-chest cardiac surgery	8.6%	15.4%	26.6%	0.004
History of malignancy	4.3%	5.8%	1.2%	0.139
Peripheral vascular disease	7.1%	1.9%	5.9%	0.427
Chronic obstructive pulmonary disease	14.3%	7.7%	4.1%	0.022
Previous stroke	4.3%	1.9%	7.1%	0.315
History of ventricular arrhythmia	25.7%	25%	27.2%	0.938
History of atrial fibrillation	15.7%	19.2%	22.5%	0.485
Previous cardiac arrest	14.3%	9.6%	17.2%	0.404
Implantable cardioverter-defibrillator	28.6%	23.1%	26%	0.791
Cardiac resynchronization therapy	8.6%	9.6%	11.8%	0.732
Active infection requiring Ix therapy	18.6%	19.2%	6.5%	0.005
Clinical status				
INTERMACS profile				0.003
INTERMACS 1	24.3%	26.9%	42.6%	
INTERMACS 2	54.3%	50%	49.1%	
Other	21.4%	23.1%	8.3%	
Systolic blood pressure (mmHg)	98 ± 15	97 ± 9	102 ± 20	0.191
Heart rate (b.p.m.)	99 ± 17	89 ± 20	98 ± 22	0.027
Supportive therapies				
Intra-aortic balloon pump	21.4%	30.8%	43.2%	0.004
Renal replacement therapy	11.4%	11.5%	7.1%	0.435
Mechanical ventilation	38.6%	61.5%	77.5%	<0.001
Vasoactive-inotropic score (units)	27 ± 71	24 ± 76	43 ± 66	0.129
Laboratory				
Leucocytes (x10 ⁹ /L)	12.0 ± 5.1	11.8 ± 4.2	12.5 ± 5.5	0.576
Platelets (x10 ⁹ /L)	180 ± 103	183 ± 89	185 ± 81	0.893
INR	1.6 ± 0.7	1.3 ± 0.3	1.6 ± 0.8	0.321
Prothrombin time (s)	20 ± 13	17 ± 6	20 ± 10	0.593
Creatinine (mg/dL)	1.1 ± 0.9	1.3 ± 0.5	1.4 ± 0.8	0.051
Haemoglobin (g/dL)	9.5 ± 1.4	9.3 ± 1.4	10.5 ± 2	<0.001
Sodium (mEq/L)	138 ± 5	139 ± 6	139 ± 8	0.172
Bilirubin (mg/dL)	1.2 ± 1.1	1.6 ± 1.8	1.9 ± 2.3	0.057
Aspartate aminotransferase (IU/L)	92 ± 139	228 ± 482	302 ± 697	0.063
Alanine aminotransferase (IU/L)	78 ± 119	148 ± 279	318 ± 718	0.015
Albumin (g/dL)	3.0 ± 0.7	2.9 ± 0.6	3.0 ± 0.8	0.596
Arterial oxygen tension (mmHg)	110 ± 54	105 ± 37	117 ± 50	0.302
pH	7.4 ± 0.1	7.4 ± 0.1	7.4 ± 0.1	0.171
Lactate (mmol/L)	1.6 ± 1.7	2.1 ± 2.3	2.4 ± 2.2	0.090
Echocardiography				
Left ventricular ejection fraction (%)	22 ± 9	25 ± 12	23 ± 13	0.358
Left ventricular end-systolic diameter (mm)	67 ± 12	62 ± 10	61 ± 13	0.049
Tricuspid annular plane systolic excursion (mm)	15 ± 4	15 ± 4	14 ± 5	0.136
Haemodynamics				
Cardiac index (mL/min/m ²)	2.4 ± 0.6	2.3 ± 0.7	2.1 ± 0.8	0.028
Central venous pressure (mmHg)	14 ± 5	12 ± 6	14 ± 6	0.316
Capillary wedge pressure (mmHg)	21 ± 8	21 ± 9	23 ± 9	0.450
Mean pulmonary pressure (mmHg)	26 ± 8	30 ± 15	30 ± 12	0.217
Transpulmonary gradient (mmHg)	8 ± 6	11 ± 8	8 ± 5	0.108

INR, international normalized ratio; INTERMACS, Interagency Registry for Mechanically Assisted Circulatory Support; T-BIVAD, temporary biventricular assist device; T-LVAD, temporary left ventricular assist device; VA-ECMO, vena-arterial extracorporeal membrane oxygenation.

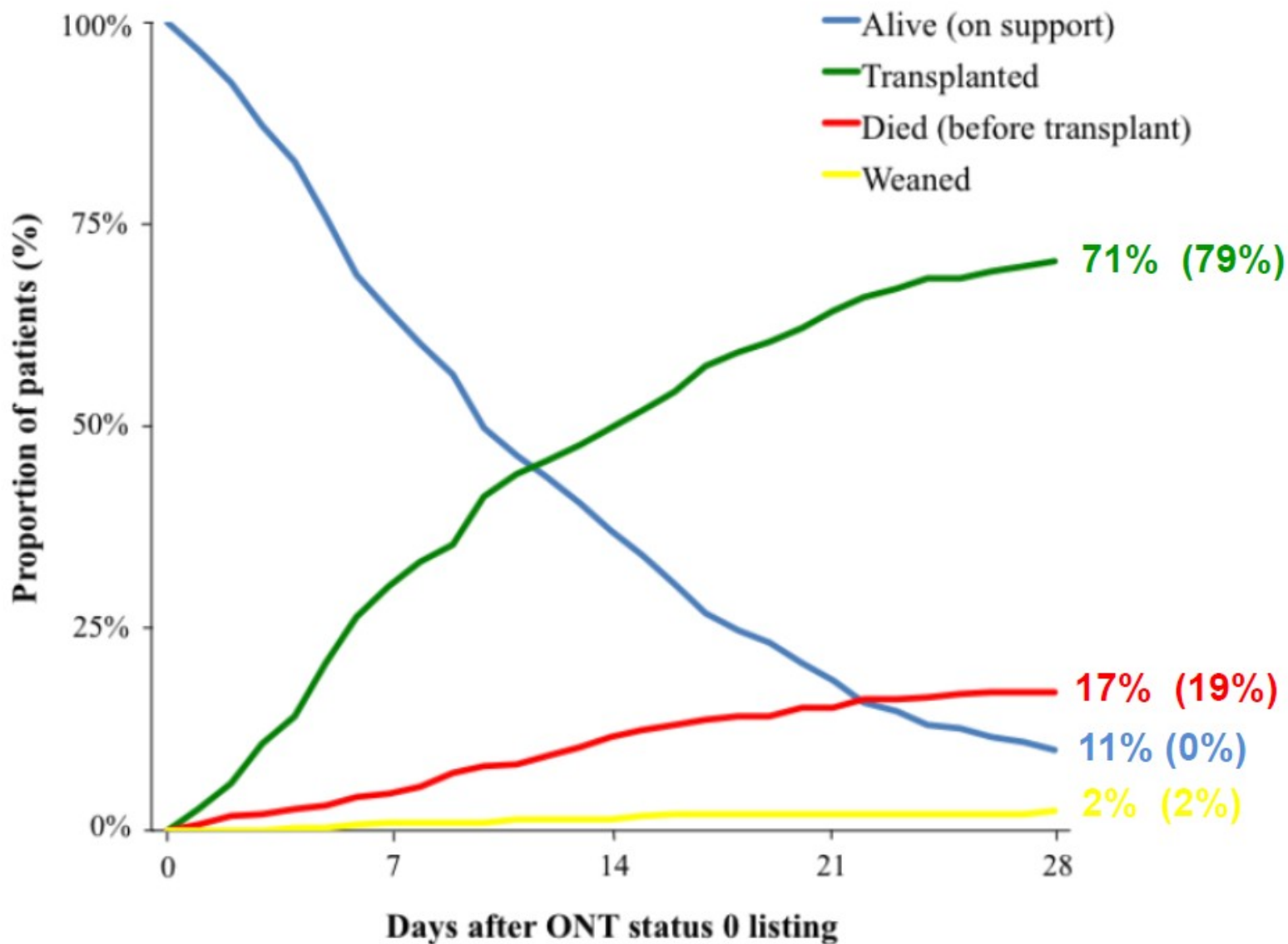
Variables	T-LVAD (n = 70)	T-BiVAD (n = 52)	VA-ECMO (n = 169)	P-value
Clinical history				
Age (years)	52 ± 12	52 ± 10	50 ± 13	0.517
Female sex	22.9%	23.1%	24.3%	0.967
Body mass index (kg/m ²)	25 ± 4	26 ± 4	26 ± 5	0.313
Days from hospital admission to device insertion	10 ± 15	14 ± 22	12 ± 20	0.440
Days from device insertion to high-urgent listing	11 ± 14	7 ± 9	3 ± 5	<0.001
Patients in waiting list prior to device insertion	28.6%	23.1%	27.8%	0.948
Ischaemic heart disease	61.4%	44.2%	53.3%	0.168
Cardiogenic shock related to acute myocardial infarction	47.1%	25.0%	32%	0.023
Cardiogenic shock following cardiac surgery	4.3%	13.5%	10.1%	0.194
Diabetes mellitus	15.7%	23.1%	25.4%	0.262
Hypertension	24.3%	34.6%	33.1%	0.344
Hypercholesterolaemia	30%	36.5%	33.1%	0.748
Previous open-chest cardiac surgery	8.6%	15.4%	26.6%	0.004
History of malignancy	4.3%	5.8%	1.2%	0.139
Peripheral vascular disease	7.1%	1.9%	5.9%	0.427
Chronic obstructive pulmonary disease	14.3%	7.7%	4.1%	0.022
Previous stroke	4.3%	1.9%	7.1%	0.315
History of ventricular arrhythmia	25.7%	25%	27.2%	0.938
History of atrial fibrillation	15.7%	19.2%	22.5%	0.485
Previous cardiac arrest	14.3%	9.6%	17.2%	0.404
Implantable cardioverter-defibrillator	28.6%	23.1%	26%	0.791
Cardiac resynchronization therapy	8.6%	9.6%	11.8%	0.732
Active infection requiring i.v. therapy	18.6%	19.2%	6.5%	0.005
Clinical status				
INTERMACS profile				0.003
INTERMACS 1	24.3%	26.9%	42.6%	
INTERMACS 2	54.3%	50%	49.1%	
Other	21.4%	23.1%	8.3%	
Systolic blood pressure (mmHg)	98 ± 15	97 ± 9	102 ± 20	0.191
Heart rate (b.p.m.)	99 ± 17	89 ± 20	98 ± 22	0.027
Supportive therapies				
Intra-aortic balloon pump	21.4%	30.8%	43.2%	0.004
Renal replacement therapy	11.4%	11.5%	7.1%	0.435
Mechanical ventilation	38.6%	61.5%	77.5%	<0.001
Vasoactive-inotropic score (units)	27 ± 71	24 ± 76	43 ± 66	0.129

Variables	T-LVAD (n = 70)	T-BiVAD (n = 52)	VA-ECMO (n = 169)	P-value
Laboratory				
Leucocytes (x10 ⁹ /L)	12.0 ± 5.1	11.8 ± 4.2	12.5 ± 5.5	0.576
Platelets (x10 ⁹ /L)	180 ± 103	183 ± 89	185 ± 81	0.893
INR	1.6 ± 0.7	1.3 ± 0.3	1.6 ± 0.8	0.321
Prothrombin time (s)	20 ± 13	17 ± 6	20 ± 10	0.593
Creatinine (mg/dL)	1.1 ± 0.9	1.3 ± 0.5	1.4 ± 0.8	0.051
Haemoglobin (g/dL)	9.5 ± 1.4	9.3 ± 1.4	10.5 ± 2	<0.001
Sodium (mEq/l)	138 ± 5	139 ± 6	139 ± 8	0.172
Bilirubin (mg/dL)	1.2 ± 1.1	1.6 ± 1.8	1.9 ± 2.3	0.057
Aspartate aminotransferase (IU/L)	92 ± 139	228 ± 482	302 ± 697	0.063
Alanine aminotransferase (IU/L)	78 ± 119	148 ± 279	318 ± 718	0.015
Albumin (g/dL)	3.0 ± 0.7	2.9 ± 0.6	3.0 ± 0.8	0.596
Arterial oxygen tension (mmHg)	110 ± 54	105 ± 37	117 ± 50	0.302
pH	7.4 ± 0.1	7.4 ± 0.1	7.4 ± 0.1	0.171
Lactate (mmol/L)	1.6 ± 1.7	2.1 ± 2.3	2.4 ± 2.2	0.090
Echocardiography				
Left ventricular ejection fraction (%)	22 ± 9	25 ± 12	23 ± 13	0.358
Left ventricular end-systolic diameter (mm)	67 ± 12	62 ± 10	61 ± 13	0.049
Tricuspid annular plane systolic excursion (mm)	15 ± 4	15 ± 4	14 ± 5	0.136
Haemodynamics				
Cardiac index (mL/min/m ²)	2.4 ± 0.6	2.3 ± 0.7	2.1 ± 0.8	0.028
Central venous pressure (mmHg)	14 ± 5	12 ± 6	14 ± 6	0.316
Capillary wedge pressure (mmHg)	21 ± 8	21 ± 9	23 ± 9	0.450
Mean pulmonary pressure (mmHg)	26 ± 8	30 ± 15	30 ± 12	0.217
Transpulmonary gradient (mmHg)	8 ± 6	11 ± 8	8 ± 5	0.108



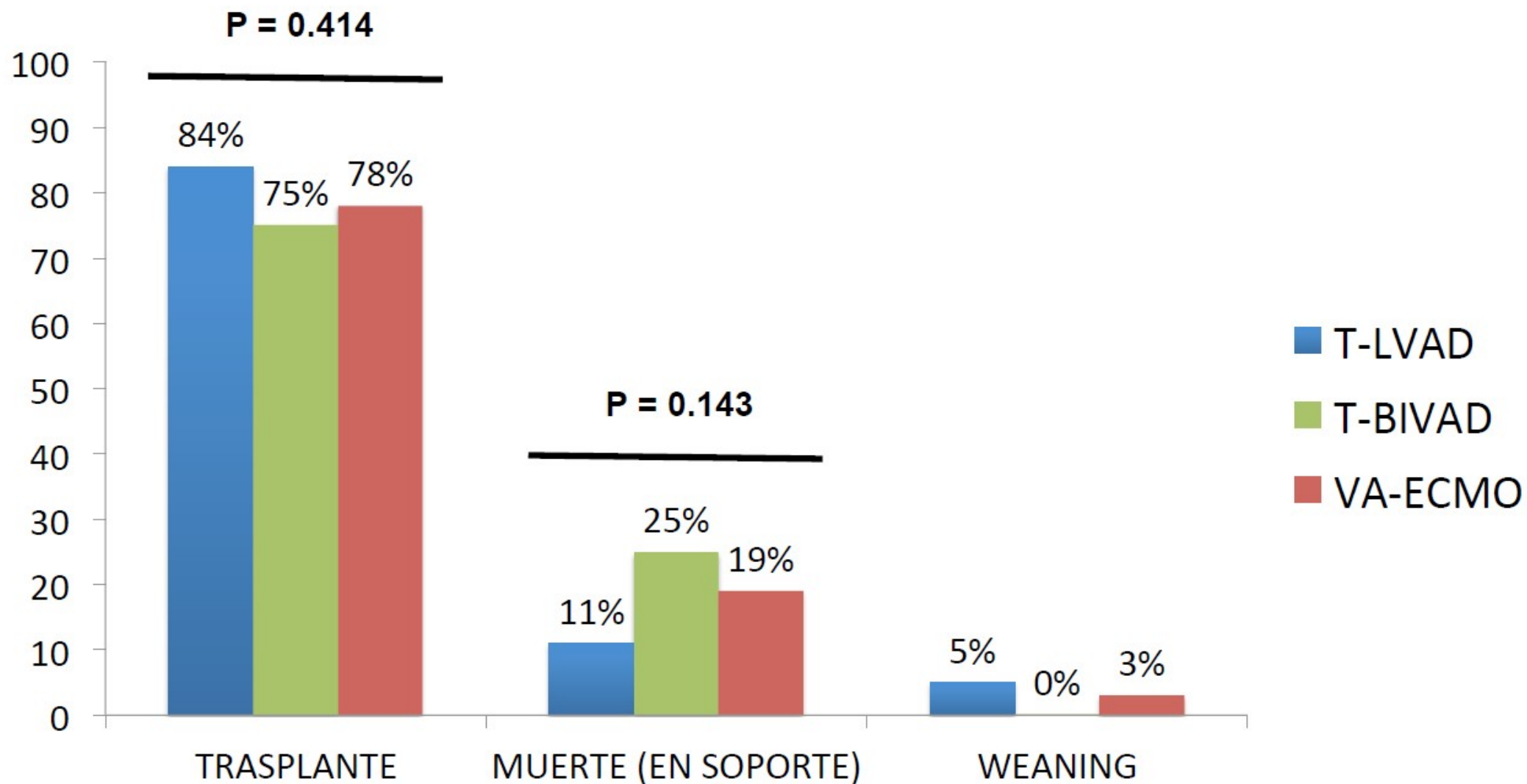
MCS CORTA DURACIÓN DESENLACE

N = 291





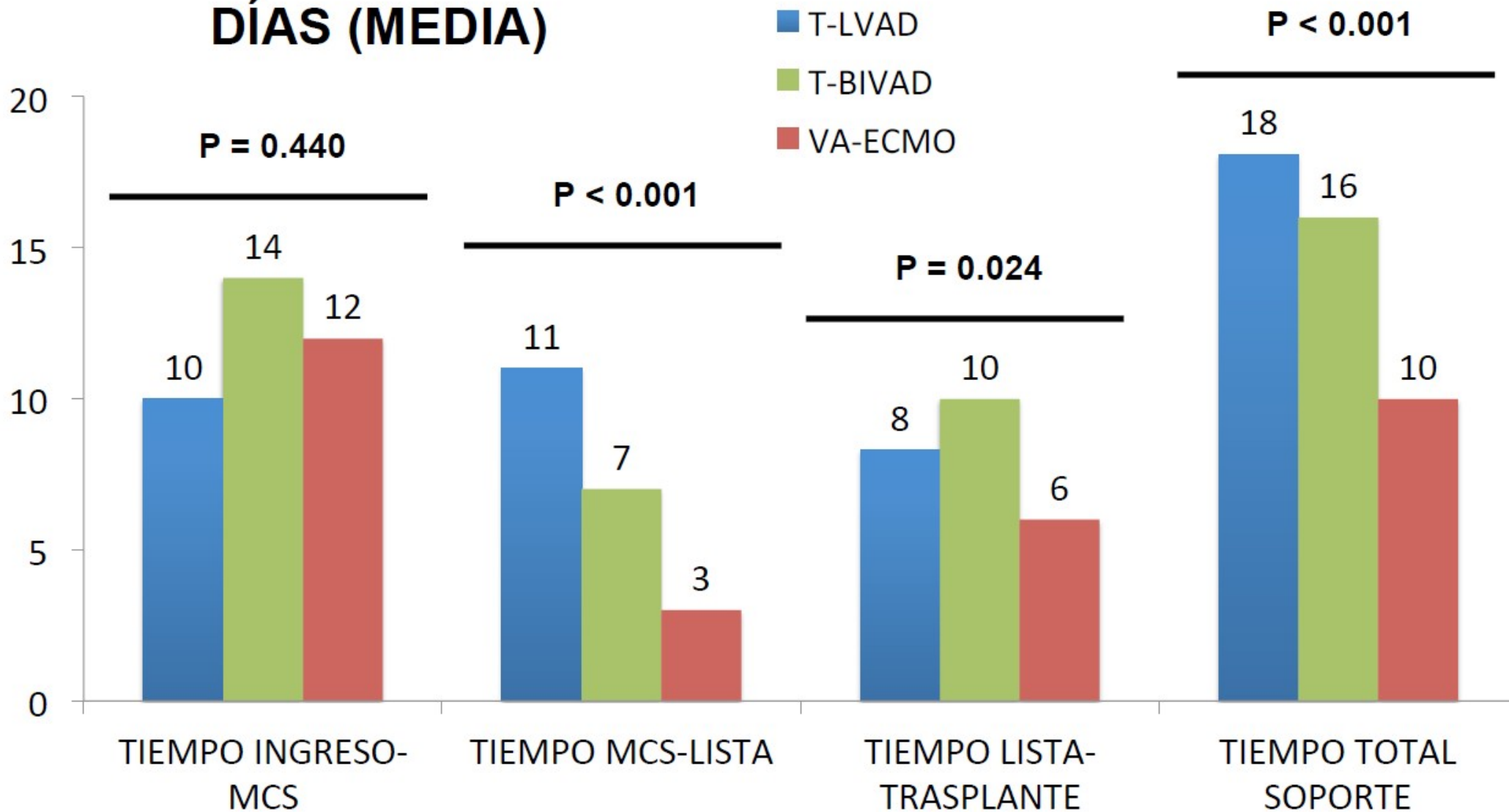
MCS CORTA DURACIÓN DESENLACE





TIEMPOS ASISTENCIALES

DÍAS (MEDIA)



DESENLACE DEL TRASPLANTE

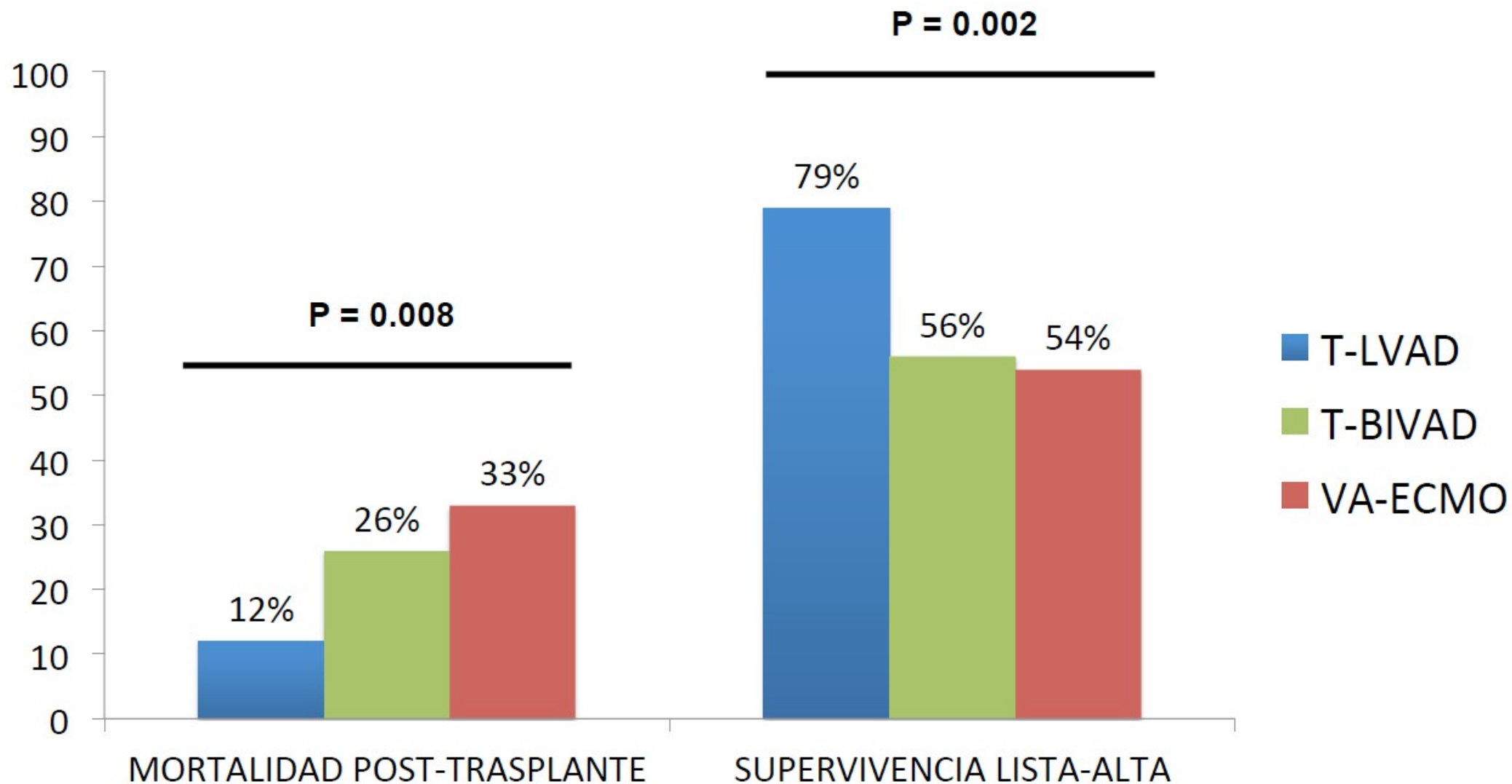
Table 3 Donor characteristics and in-hospital postoperative outcomes after heart transplantation

	All patients (n = 230)	T-LVAD (n = 59)	T-BiVAD (n = 42)	VA-ECMO (n = 129)	P-value
Donor characteristics					
Female donor	59 (26%)	13 (22%)	11 (27%)	35 (26%)	0.756
Age (years)	42 ± 12	42 ± 13	43 ± 12	42 ± 11	0.958
Cold ischaemic time (min)	214 ± 60	213 ± 56	232 ± 46	209 ± 65	0.101
In-hospital postoperative outcomes					
Excessive surgical bleeding	72 (31%)	15 (25%)	18 (43%)	39 (30%)	0.163
Primary graft failure	75 (33%)	16 (27%)	17 (41%)	42 (33%)	0.369
Right ventricular failure	41 (18%)	7 (12%)	10 (24%)	24 (19%)	0.645
Left ventricular or biventricular failure	34 (15%)	9 (15%)	7 (17%)	18 (14%)	0.422
T-MCS after transplant	34 (15%)	7 (12%)	6 (14%)	21 (16%)	0.729
Open-chest redo surgery	40 (17%)	6 (10%)	10 (24%)	24 (19%)	0.176
Renal failure	64 (28%)	15 (25%)	15 (36%)	34 (26%)	0.447
Postoperative infection	121 (53%)	32 (54%)	23 (55%)	66 (51%)	0.883
In-hospital postoperative death	61 (26%)	7 (12%)	11 (26%)	43 (33%)	0.008
Days on ventilator after transplant	11 ± 17	8 ± 9	10 ± 14	13 ± 21	0.196
Days of ICU stay after transplant	18 ± 18	16 ± 22	20 ± 19	18 ± 19	0.725
Days of hospital stay after transplant	38 ± 37	36 ± 29	39 ± 34	38 ± 40	0.930

ICU, intensive care unit; T-BiVAD, temporary biventricular assist device; T-LVAD, temporary left ventricular assist device; T-MCS, temporary mechanical circulatory support; VA-ECMO, veno-arterial extracorporeal membrane oxygenation.

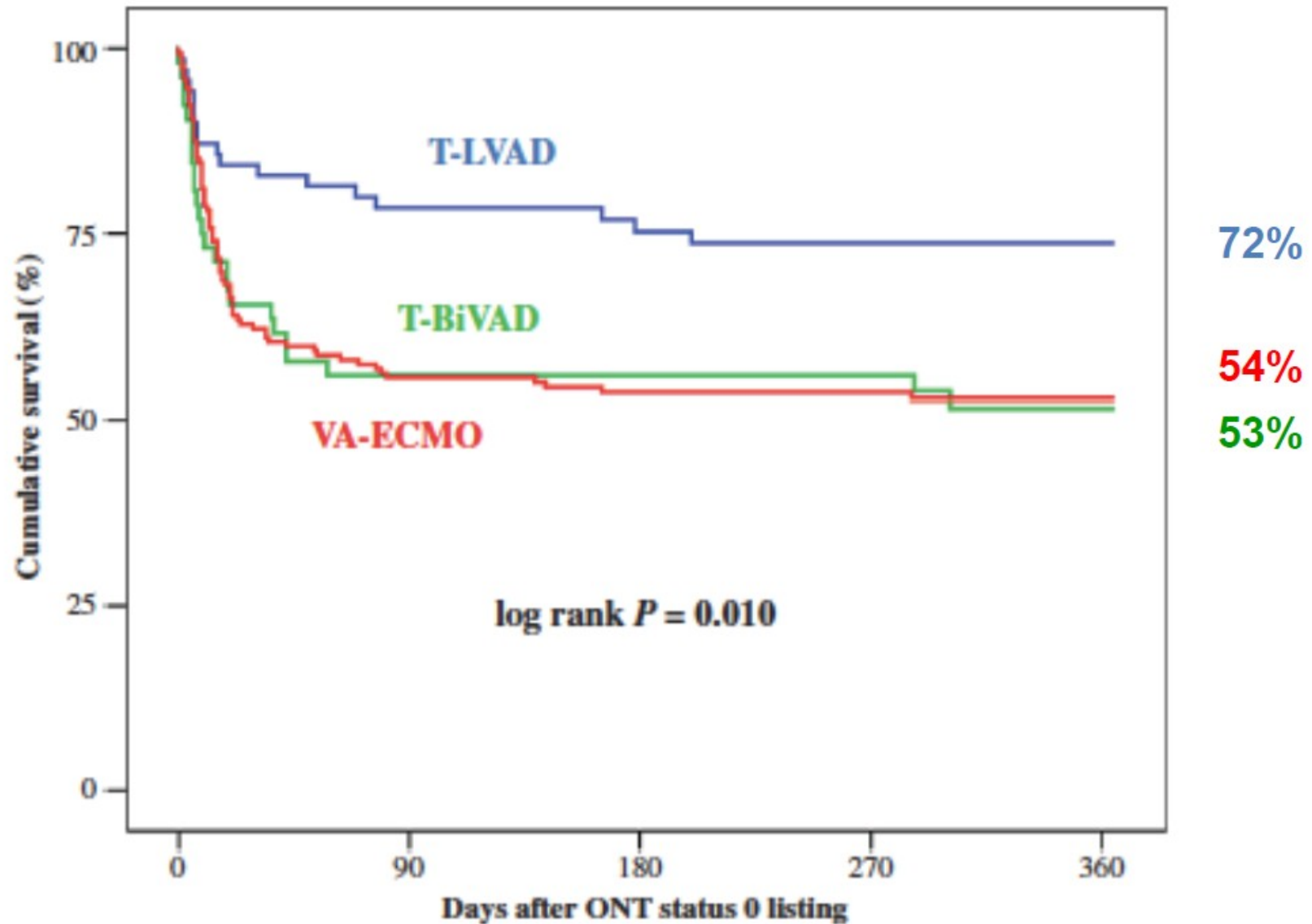


SUPERVIVENCIA INTRAHOSPITALARIA





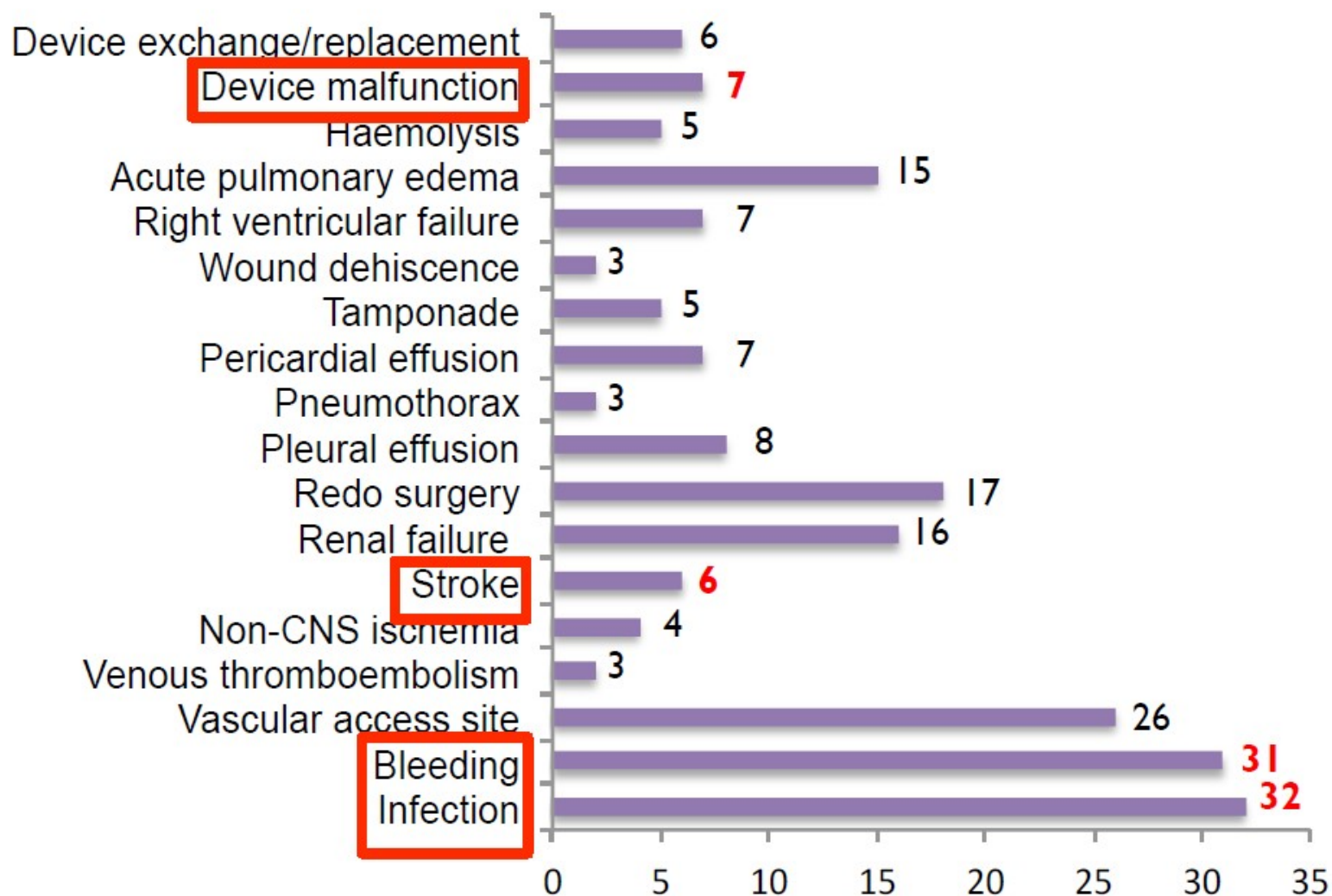
SUPERVIVENCIA TRAS INCLUSIÓN EN LE





EVENTOS ADVERSOS DURANTE SOPORTE

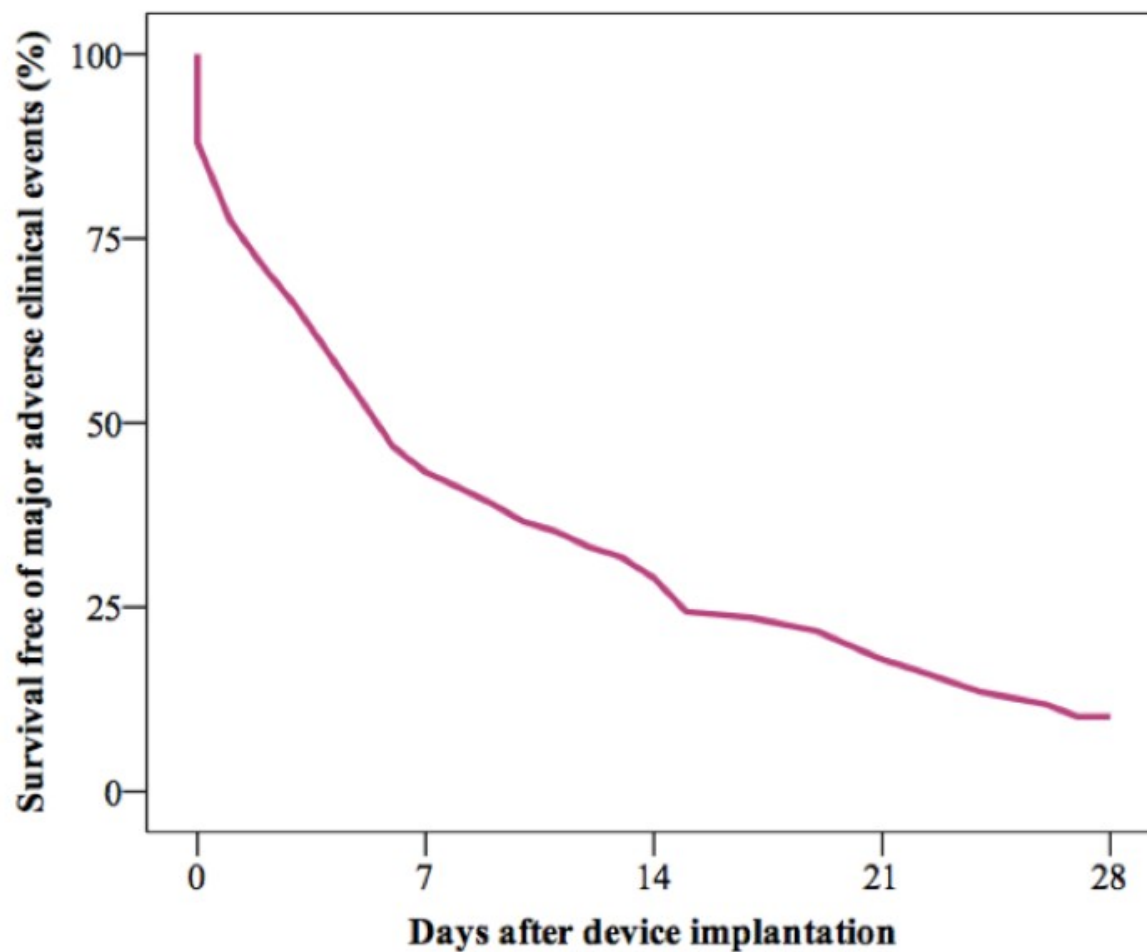
Adverse Clinical Events (ACE) / 1000 patients-day





EVENTOS ADVERSOS MAYORES DURANTE EL SOPORTE

Survival free of major ACE*



**Bleeding, stroke, device malfunction, or infection*



EVENTOS ADVERSOS SEGÚN TIPO DE SOPORTE

Adverse Clinical Events (ACE) / 1000 patients-day

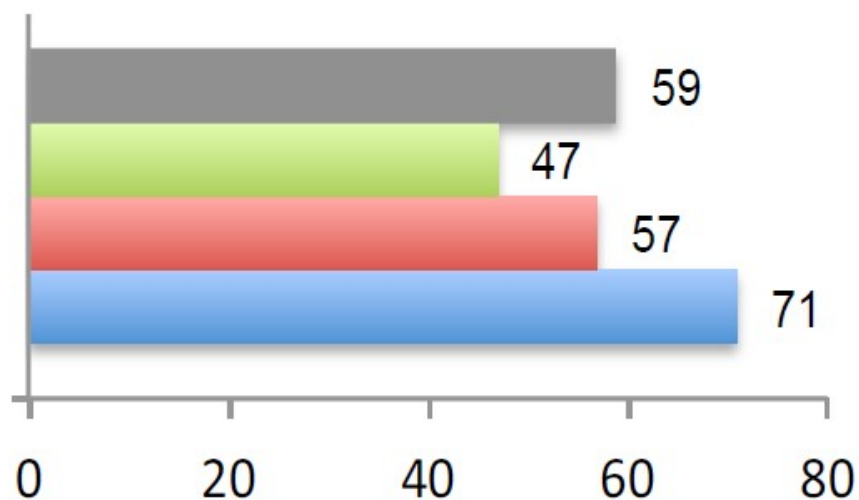
■ All patients

■ T-LVAD

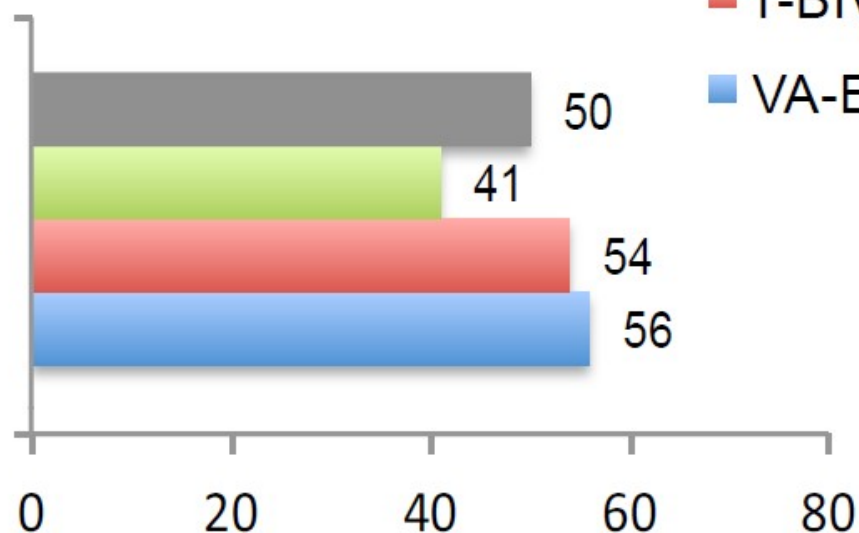
■ T-BIVAD

■ VA-ECMO

Any ACE



Any major ACE*



*Bleeding, stroke, device malfunction, or infection



SUPERVIVENCIA TRAS INCLUSIÓN EN LE FACTORES PRONÓSTICOS

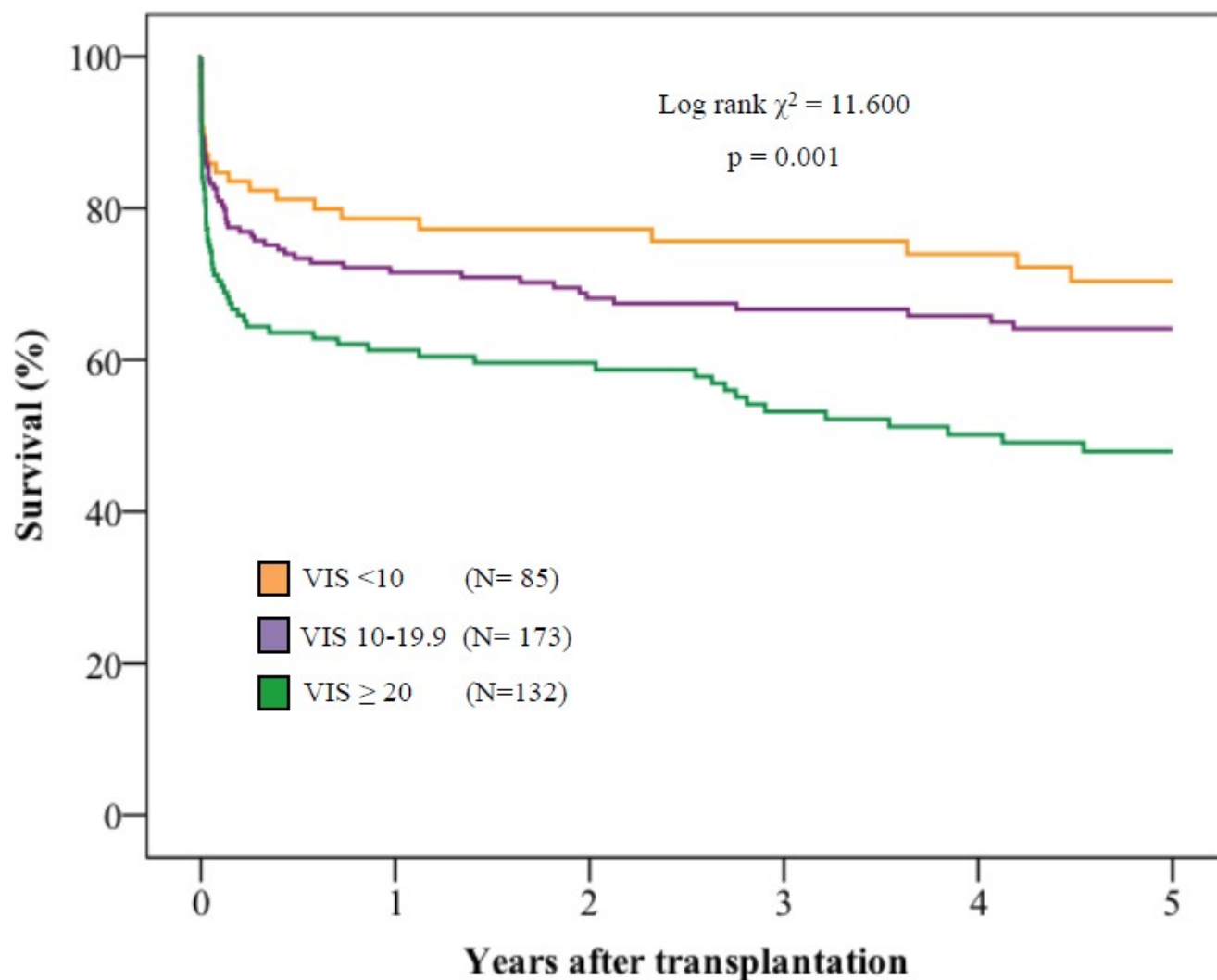
Table 4 Clinical predictors of 1-year all-cause mortality: univariable and multivariable Cox proportional hazards regression

	Univariable analysis			Multivariable analysis		
	Unadjusted HR	95% CI	P-value	Adjusted HR	95% CI	P-value
Age (per 10 years)	1.21	1.03–1.42	0.023	1.29	1.06–1.56	0.010
Vasoactive-inotropic score (per 10 units)	1.03	1.06–1.09	<0.001	1.07	1.04–1.10	<0.001
Creatinine (mg/dL)	1.33	1.10–1.60	0.004	–	–	–
Lactate (mmol/L)	1.11	1.03–1.21	0.009	1.10	1.00–1.20	0.049
Renal replacement therapy	2.22	1.35–3.67	<0.001	2.02	1.06–3.84	0.032
Isolated LVAD support	0.47	0.29–0.78	0.003	0.52	0.30–0.92	0.025
Mechanical ventilation	1.67	1.12–2.49	0.012	–	–	–
Intra-aortic balloon pump	1.48	1.03–2.12	0.033	–	–	–
Active infection requiring i.v. therapy	1.74	1.08–2.02	0.023	2.13	1.20–2.79	0.010
INTERMACS profile 1	2.03	1.42–2.90	<0.001	–	–	–

CI, confidence interval; HR, hazard ratio; INTERMACS, Interagency Registry for Mechanically Assisted Circulatory Support; LVAD, left ventricular assist device.



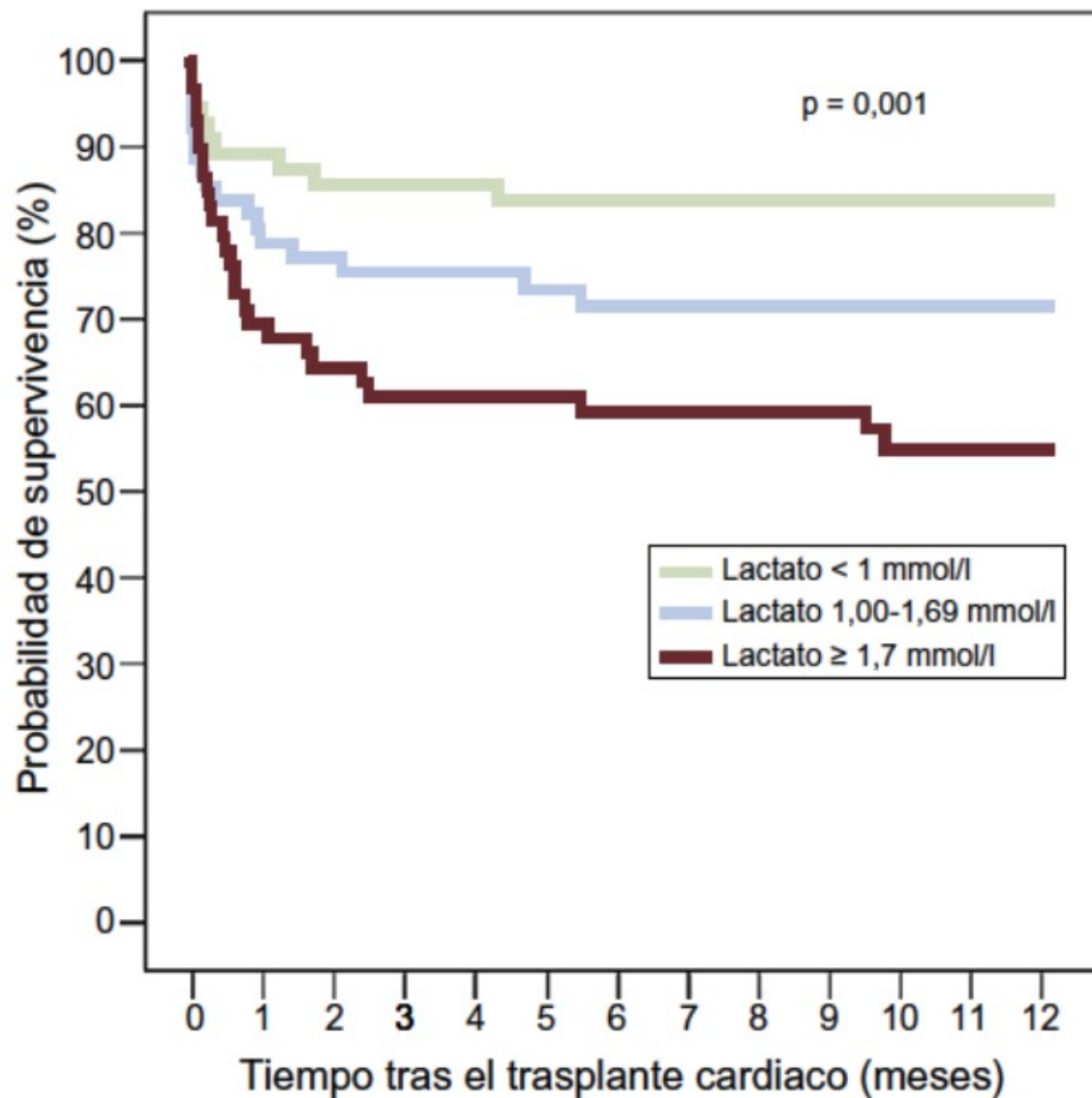
PRONÓSTICO INDICE VASOACTIVO-INOTROPICO



HR = 1.005 (IC 95% 1.003-1.008)

HR VIS ≥ 20 = 1.80 (IC 95% 1.23-2.56)

PRONÓSTICO LACTATO SÉRICO





CONCLUSIONES

1. La ACM de corta duración tiene un **papel central** en el manejo del shock cardiogénico.
2. Las indicaciones de la ACM de corta duración son **punto de decisión, recuperación ó TC**.
3. Es importante seleccionar el **dispositivo adecuado** para cada paciente.
4. El campo de la ACM evoluciona rápidamente hacia **abordajes menos invasivos**.
5. Los **resultados** de la ACM de corta duración en España son **satisfactorios**.

V Reunión. Estado del Arte en

INSUFICIENCIA CARDIACA AVANZADA



www.cardioatrio.com

PRÁCTICA CLÍNICA Y
MODELOS ORGANIZATIVOS

Sede: Salon de Actos (4^º planta) del
Complejo Hospitalario Universitario de
A Coruña

A CORUÑA | 22-23 Junio, 2018



Fotografía: Santiago Saliz Fouz



Fotografía: Xacobe Melendrez Fassbender