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VALÈNCIA

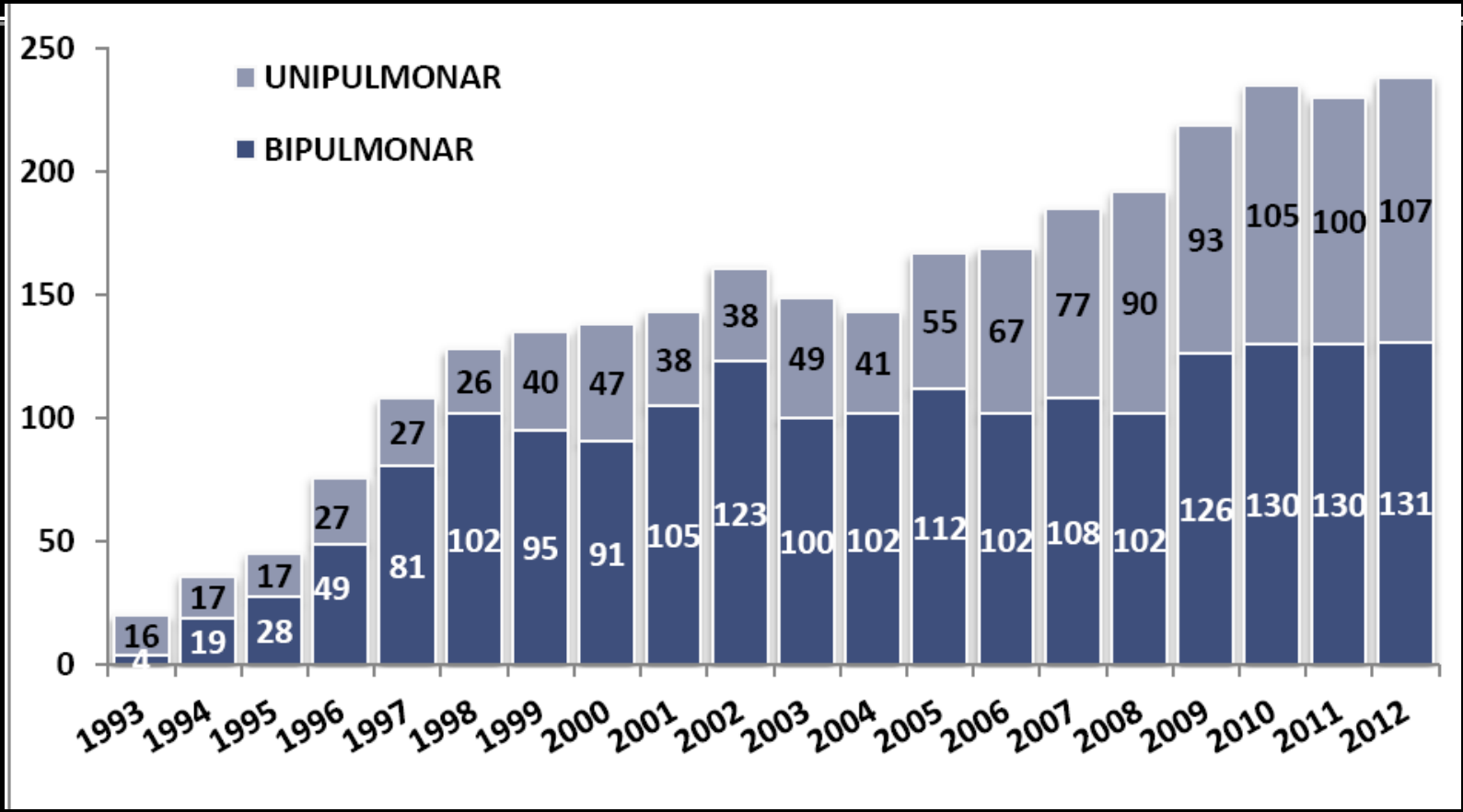
Método de ayuda cardiopulmonar en el peritrasplante pulmonar: ECMO *Visión desde la Anestesia y Reanimación*

Dra. Rosario Vicente Guillén

Hospital Universitario La Fe -Valencia-

SARTD-CHGUV Sesión de Formación Continuada
Valencia 11 de Marzo de 2014

Trasplante pulmonar



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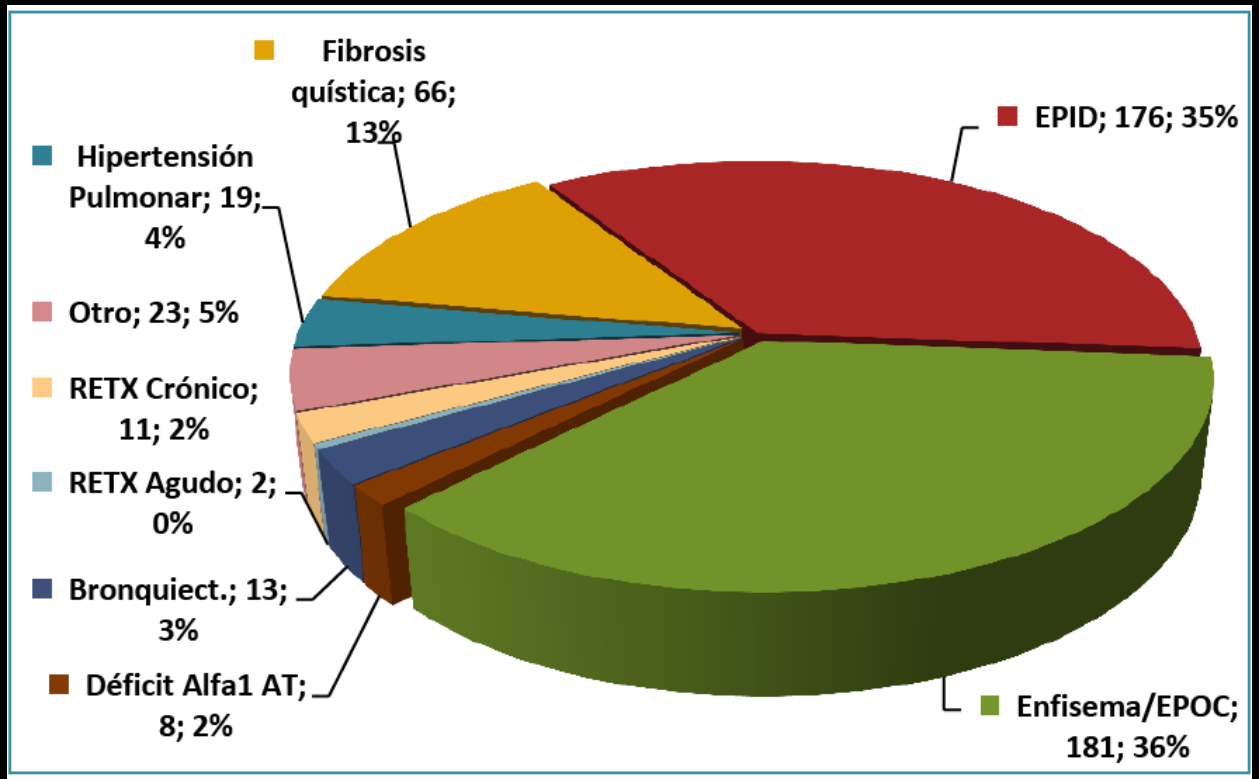
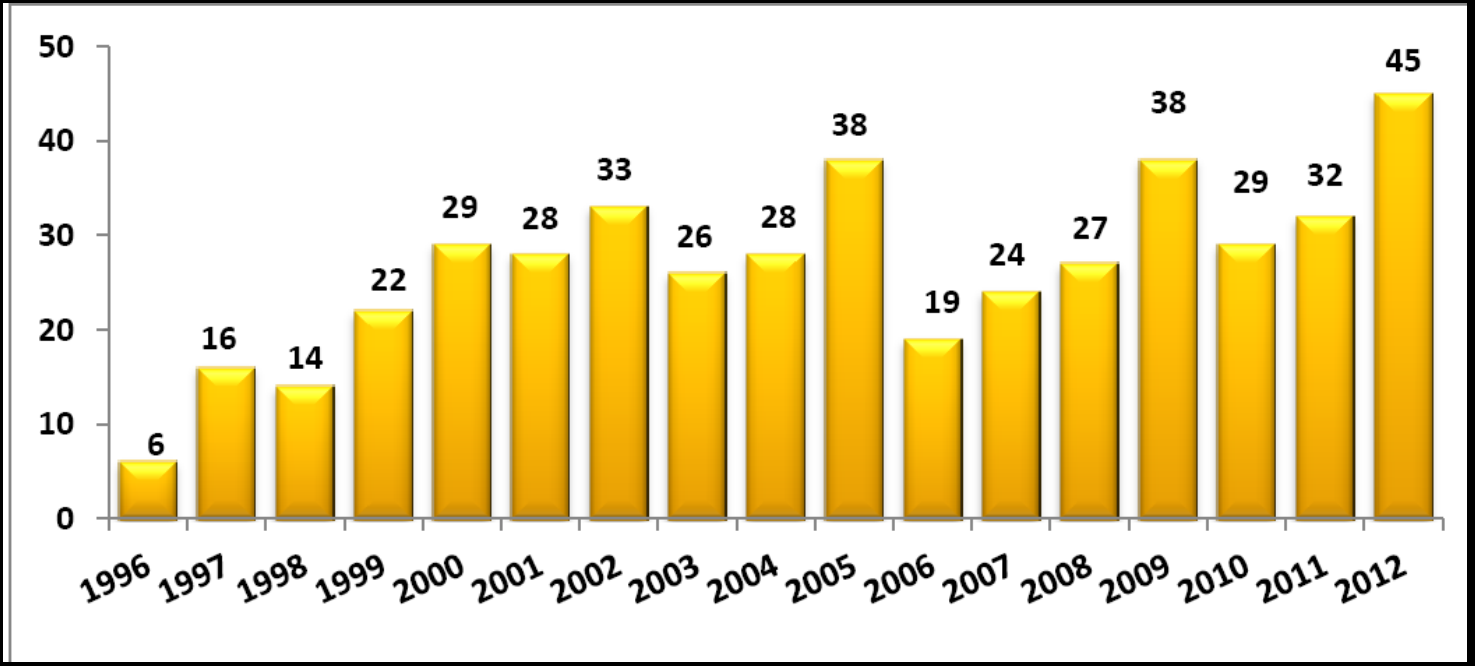
Trasplante pulmonar



LISTA DE ESPERA N= 499

Trasplante pulmonar



Nº global inclusiones en Urgencia 0 para trasplante pulmonar, España 1996-2012

ADULT LUNG TRANSPLANT RECIPIENTS: Cause Of Death

(Deaths: January 1992- June 2011)

CAUSE OF DEATH	0-30 Days (N = 1,966)	31 Days – 1 Year (N = 3,387)	>1 Year – 3 Years (N = 3,073)	>3 Years – 5 Years (N = 1,737)	>5 Years – 10 Years (N = 2,014)	>10 Years (N = 483)
BRONCHIOLITIS	6 (0.3%)	159 (4.7%)	781 (25.4%)	508 (29.2%)	507 (25.2%)	95 (19.7%)
ACUTE REJECTION	74 (3.8%)	61 (1.8%)	48 (1.6%)	10 (0.6%)	15 (0.7%)	1 (0.2%)
LYMPHOMA	1 (0.1%)	86 (2.5%)	63 (2.1%)	28 (1.6%)	46 (2.3%)	23 (4.8%)
MALIGNANCY, OTHER	4 (0.2%)	100 (3.0%)	202 (6.6%)	151 (8.7%)	219 (10.9%)	47 (9.7%)
CMV	0	96 (2.8%)	29 (0.9%)	5 (0.3%)	4 (0.2%)	0
INFECTION, NON-CMV	396 (20.1%)	1,205 (35.6%)	710 (23.1%)	329 (18.9%)	363 (18.0%)	81 (16.8%)
GRAFT FAILURE	557 (26.0%)	589 (17.4%)	591 (19.2%)	327 (18.8%)	379 (18.8%)	87 (18.0%)
CARDIOVASCULAR	213 (10.8%)	144 (4.3%)	118 (3.8%)	82 (4.7%)	99 (4.9%)	36 (7.5%)
TECHNICAL	162 (8.2%)	76 (2.2%)	18 (0.6%)	8 (0.5%)	12 (0.6%)	6 (1.2%)
OTHER	553 (28.1%)	871 (25.7%)	513 (16.7%)	289 (16.6%)	370 (18.4%)	107 (22.2%)

ISHLT

J Heart Lung Transplant. 2012 ; 31 (10): 1073-1086

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Métodos de ayuda cardiopulmonar

PRESENTE

EXTRACORPÓREO

Circuito externo de sangre

CPB, ECMO, iLA

Soporte temporal

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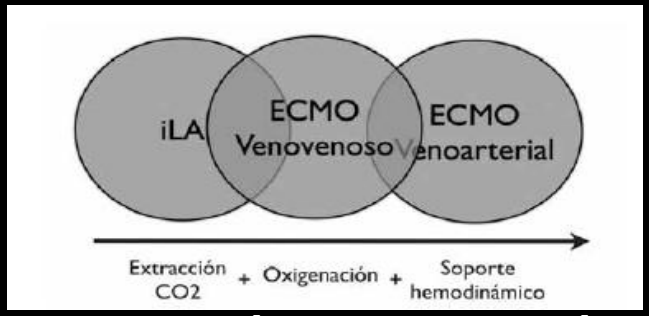
Diferencias en los soportes vitales extracorpóreos

	CEC	ECMO VA	ECMO VV	ART-VENOSO (iLA)
Flujo extracorpóreo (% GC)	100%	30-80%	30-90%	20-30%
Efecto cardiaco	Soporte total	Soporte parcial	Sin soporte	Extracarga
Duración habitual	< 6 horas	< 21 días	< 21 días	< 30 días
TCA	> 400	150-250	150-250	150
% O2 aportado por membrana	100%	20-90%	20-90%	20%
% CO2 extraído por membrana	100%	20-90%	20-90%	50%
Canulación de retorno más habituales	AO, fem, axilar	fem, axilar Central	YID o fem	fem



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European Journal of Cardio-thoracic Surgery 37 (2010) 969–971

EUROPEAN JOURNAL OF CARDIO-THORACIC SURGERY

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Case report

Lung transplantation following 107 days of extracorporeal membrane oxygenation

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Received 9 July 2009; received in revised form 15 September 2009; accepted 19 September 2009; Available online 5 November 2009

Abstract

Severe adult respiratory distress syndrome (ARDS) is associated with failure to maintain adequate gas exchange. There is increasing success using extracorporeal membrane oxygenation (ECMO) for respiratory failure; the longest reported surviving patient has been supported by ECMO for 57 days. At best about 50% wean from ECMO and should weaning fail their course is fatal. ECMO is generally considered to be a contraindication for successful lung transplantation. This report describes a patient maintained on ECMO for 107 days who underwent bilateral lung transplantation and weaned from organ-perfusion support. He survived for 351 days post-transplantation and died from *Pseudomonas aeruginosa* pneumonia. ECMO can be used for prolonged intervals to support patients with severe ARDS without complications that preclude lung transplantation. As ECMO use becomes more frequent, it becomes critical to determine criteria that would optimise patient selection for transplantation from ECMO.

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ECMO: Extracorporeal membrane oxygenation

Sistema de asistencia mecánica extracorpórea cardiaca y pulmonar aplicable durante un periodo de días o semanas.

Indicado en el shock cardiogénico o insuficiencia respiratoria severa que no responden al tratamiento convencional óptimo:

- Como puente a la recuperación (bridge to recovery)
- Como puente a TP (bridge to transplantation)

CRITERIOS DE ENTRADA EN ECMO

ENTRADA RÁPIDA	PaO_2/FiO_2 <100 mm Hg durante 12 h a FiO_2 1 PEEP **>** 10 cm H_2O
PATOLOGÍA OBSTRUCTIVA VÍA AÉREA	Hipercapnia severa no corregible, pH < 7 y presión teleinspiratoria > 45 mm Hg
CRITERIOS HEMODINÁMICOS	IC <1.8 -2 l/m/m_2.PCP > 20 mm Hg. TA < 90 mmHg

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The Journal of Heart and Lung Transplantation
http://www.jhltonline.org

CLINICAL DILEMMAS

Usefulness of extracorporeal membrane oxygenation as a bridge to lung transplantation: A descriptive study

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From the Departments of [a]Cardiothoracic Surgery and [b]Cardiothoracic Anesthesia and Intensive Care, Helsinki University Hospital, Helsinki, Finland; and the Departments of [c]Cardiothoracic Surgery, [d]Transplant Institute, and [e]Cardiothoracic Anesthesia and Intensive Care, Sahlgrenska University Hospital, Gothenburg, Sweden.

The Journal of Heart and Lung Transplantation
The Official Publication of the International Society for Heart and Lung Transplantation (ISHLT)

J Heart Lung Transplant 2011;30:103-7

Table 3 Patients Bridged With Extracorporeal Membrane Oxygenation to Lung Transplantation

Pt	Age	Diagnosis	vv-ECMO	va-ECMO	LTx date	Procedure	ECMO days	ICU days
1	38	Pulmonary fibrosis	2005-03-01	2005-04-08	2005-04-21	DL	51	53
2	37	Pulmonary fibrosis		2005-06-01	2005-06-02	DL	1	13
3	25	Graft failure after LTx		2006-02-12	2006-03-06	SL	11	15
4	48	Acute interstitial pneumonia	2007-05-24	2007-05-24	2007-06-27	DL	34	28
5	38	ARDS	2008-01-29		2008-02-10	DL	12	57
6	36	BOS/chronic rejection	2008-03-14		2008-03-27	DL/wedge	13	22
7	48	IPAH		2008-04-02	2008-04-16	DL/lobectomy	14	29
8	36	PVOD		2008-09-20	2008-09-21	DL	1	18
9	28	Cystic fibrosis	2009-01-10		2009-01-12	DL	2	3
10	46	Pulmonary fibrosis	2008-12-15	2009-01-16	2009-02-12	DL	59	20
11	51	Pulmonary fibrosis	2009-08-27		2009-09-01	DL	5	27
12	51	IPAH		2009-09-09	2009-09-22	DL	13	21
13	45	Pulmonary fibrosis	2009-10-18		2009-10-20	DL	2	60

ARDS, acquired respiratory distress syndrome; BOS, bronchiolitis obliterans syndrome; DL, double-lung transplant; ECMO, extracorporeal membrane oxygenation; ICU, intensive care unit; IPAH, Idiopathic pulmonary arterial hypertension; LTx, lung transplantation; PVOD, pulmonary veno-occlusive disease; SL, single lung; vaECMO, venoarterial ECMO; vvECMO, venovenous ECMO.

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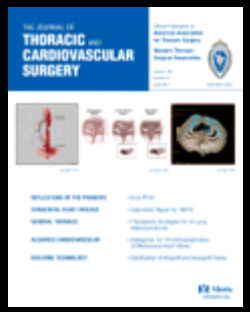

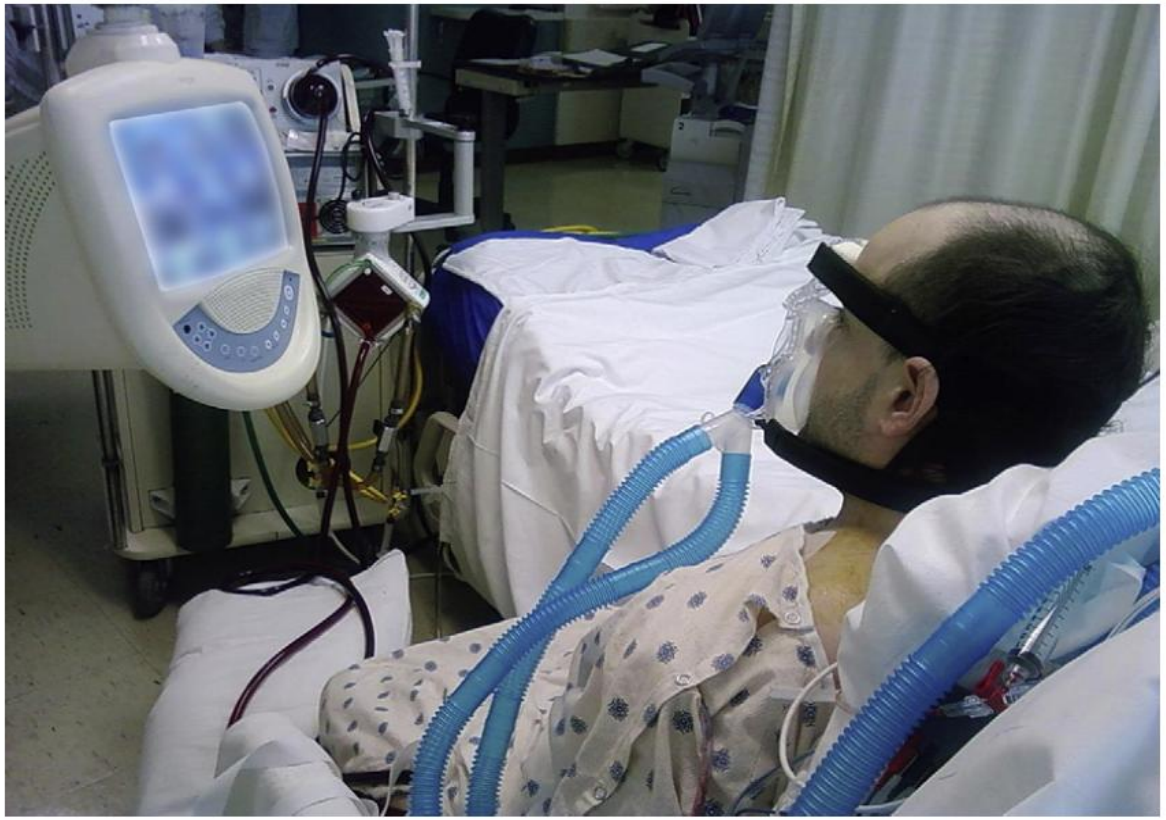

FIGURE 1. Patient out of bed and awake with ECMO support.

Bridge to lung transplantation using short-term ambulatory extracorporeal membrane oxygenation

Abeel A. Mangi, MD, David P. Mason, MD, James J. Yun, MD, PhD, Sudish C. Murthy, MD, PhD, and Gosta B. Pettersson, MD, PhD, Cleveland, Ohio

The Journal of Thoracic and Cardiovascular Surgery • September 2010

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Valencia 11 de Marzo de 2014

Interactive CardioVascular and Thoracic Surgery 16 (2013) 55–59
doi:10.1093/icvts/ivs433 Advance Access publication 24 October 2012

ORIGINAL ARTICLE - THORACIC

Extracorporeal membrane oxygenation with spontaneous breathing as a bridge to lung transplantation†

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	All patients	Awake–ECMO group	IMV–ECMO group	*P*-value
Number	11	7	4	
Male/female	5/6	4/3	1/3	ns
Age (years)	33.9 ± 13.2	33.8 ± 12.6	34.0 ± 16.2	ns
BMI	20.5 ± 3.7	21.2 ± 4.2	19.0 ± 2.2	ns
pO_2/FiO_2 before ECMO	151.0 ± 120.31	167.5 ± 147.8	122.2 ± 52.7	ns
pCO_2 before ECMO	86.8 ± 34.6	75.8 ± 32.8	106.1 ± 32.6	ns
pH before ECMO	7.23 ± 0.14	7.28 ± 0.13	7.15 ± 0.14	ns
SOFA before ECMO	4.9 ± 1.4	5.0 ± 1.5	4.7 ± 1.5	ns
Bridging time (days)	12.1 ± 14.7	12.1 ± 18.3	12.2 ± 7.0	ns
SOFA before LTx	7.4 ± 2.3	6.2 ± 1.2	9.5 ± 2.6	ns
LTx double/single	11/0	7/0	4/0	
Operative mortality	1	1	0	ns
IMV after LTx (days)	27.1 ± 20.7	18.1 ± 18.1	40.5 ± 18.6	ns
ECMO after LTx (days)	4.6 ± 4.6	5.3 ± 5.6	3.5 ± 3.1	ns
ICU stay (days)	30 ± 20.4	21.1 ± 18.8	43.2 ± 16.5	ns
Haemodialysis after LTx (yes/no)	5/5	2/4	3/1	ns
PGD 72 h grade 0/1/2/3	1/4/1/4	1/2/0/3	0/2/1/1	ns
CIP–CIM	7	3	4	0.04
SOFA 7 day	5.1 ± 4.3	4.1 ± 4.4	6.5 ± 4.5	ns
Hospital stay (days)	47.6 ± 21.9	38.1 ± 19.1	61.7 ± 19.6	ns

ECMO: extracorporeal membrane oxygenation; IMV: invasive mechanical ventilation; BMI: body mass index; SOFA: sequential organ failure assessment; LTx: lung transplantation; ICU: intensive care unit; PGD: primary graft dysfunction; CIP: critically ill polyneuropathy; CIM: critically ill myopathy.

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Extracorporeal Circulatory Systems as a Bridge to Lung Transplantation at Remote Transplant Centers

Assad Haneya, MD, Alois Philipp, ECCP, Thomas Mueller, MD, Matthias Lubnow, MD, Michael Pfeifer, MD, PhD, Wolfgang Zink, MD, PhD, Michael Hilker, MD, PhD, Christof Schmid, MD, PhD, and Stephan Hirt, MD, PhD

Department of Cardiothoracic Surgery, Anesthesiology, and Internal Medicine II, University Medical Center Regensburg, Regensburg, Germany

(Ann Thorac Surg 2011;91:250–6)

Table 2. Overview of Extracorporeal Support (ECS) and Patient Outcome

Pt. No	ECS Mode	Implantation Place	ECS Duration 23 (5–73) Days	Weaned From Ventilator	Weaned From ECS	LTx	Outcome
1	VV-ECMO	Not at UMCR	6	–	–	–	NS
2	PECLA	At UMCR	5	–	–	+	S
3	VV-ECMO	Not UMCR	24	–	–	+	NS
4	VV-ECMO→PECLA	At UMCR	15 (18)	+	+	+	S
5	VV-ECMO	At UMCR	10	–	–	+	S
6	PECLA	At UMCR	10	+	+	+	S
7	VA-ECMO→PECLA	At UMCR	9 (64)	+	–	+	S
8	VA-ECMO	At UMCR	50	–	–	–	NS
9	PECLA	At UMCR	22	+	+		Δ[a]
10	VV-ECMO	At UMCR	67	+	–	+	S

[a] Was successfully weaned, waiting for lung transplantation.

ECMO = extracorporeal membrane oxygenation; LTx = lung transplantation; NS = nonsurvivor; PECLA = pumpless extracorporeal lung assist; S = survivor; UMCR = University Medical Center Regensburg; VA-ECMO→PECLA = venoarterial ECMO changed to arteriovenous PECLA; VV-ECMO→PECLA = venovenous ECMO changed to arteriovenous PECLA.

ARTICLE IN PRESS

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The Journal of Heart and Lung Transplantation
http://www.jhltonline.org

Impact of extracorporeal life support on outcome in patients with idiopathic pulmonary arterial hypertension awaiting lung transplantation

Marc de Perrot, MD, John T. Granton, MD, Karen McRae, MD, Marcelo Cypel, MD, Andrew Pierre, MD, Thomas K Waddell, MD, Kazuhiro Yasufuku, MD, Michael Hutcheon, MD, Cecilia Chaparro, MD, Lianne Singer, MD, Shaf Keshavjee, MD

From the Toronto Lung Transplant Program, University of Toronto, Toronto, Ontario, Canada.

Table 2 Pre-transplant Management

Variable	1998–2005 (n = 23) No. (%)	2006–2010 (n = 21) No. (%)	p-value
In-hospital pre-transplant	1 (4)	10 (48)	0.0009
Atrial septostomy	2 (9)	0	0.2
Extracorporeal life support	0	6 (29)	0.006
PA-LA Novalung	0	4	
VA ECMO	0	2	
Inotropic support	0	5 (25)	0.01
Intubated	0	4 (20)	0.02
Waiting list mortality	5 (22)	0	0.03
Type of transplant			0.05
Bilateral lung	18	17	
Heart-lung	0	4	

ECMO, extracorporal membrane oxygenation; LA, left atrium; PA, pulmonary artery; VA, venoarterial.

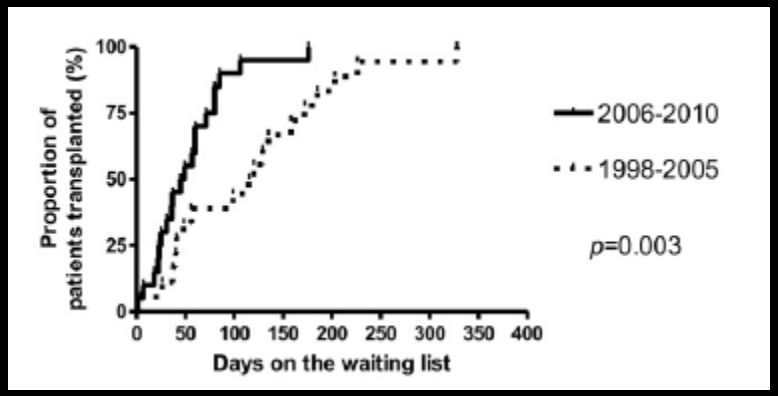

Table 3 Patients Bridged to Lung Transplant With Extracorporeal Life Support

Patient	ECLS mode	ECLS duration (days)	Extubation & rehab	Inotropic support	Type of transplant	Outcome	Follow-up (mon)
1	VA-ECMO	1	No	Yes	Heart-lung	Died, BO	18
2	PA-LA Novalung	21	No	Yes	Bilateral lung	Alive & well	28
3	PA-LA Novalung	30	Yes	No	Bilateral lung	Alive & well	26
4	VA-ECMO	3	No	Yes	Heart-lung	Died, PRES	2
5	PA-LA Novalung	9	Yes	No	Bilateral lung	Alive & well	5
6	PA-LA Novalung	69	Yes	No	Bilateral lobar lung	Died, PGD	0.2

BO, bronchiolitis obliterans; ECLS, extracorporeal life support; ECMO, extracorporeal membrane oxygenation; LA, left atrium; PA, pulmonary artery; PRES, posterior reversible encephalopathy syndrome, PGD, primary graft dysfunction; VA, venoarterial.

Table 4 Early Post-transplant Outcome

Variable	1998–2005 (n = 18)	2006–2010 (n = 21)	p-value
30-day mortality, No.	3	2	0.5
Severe PGD[a], No.	4	5	0.9
LOS (mean ± SD)			
Intensive care unit	17 ± 13	36 ± 30	0.02
Hospital	35 ± 27	66 ± 68	0.08

LOS, length of stay; PGD, primary graft dysfunction; SD, standard deviation.

[a]Defined by PGD III persistent during the initial 72 hours after transplant.

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TÉCNICA QUIRÚRGICA

- **TRASPLANTE UNILATERAL**

Toracotomía 5º espacio intercostal

Disección pulmonar

Neumonectomía

Anastomosis

– Bronquio Arteria P Aurícula izq.

TÉCNICA QUIRÚRGICA

- **TRASPLANTE BIPULMONAR SECUENCIAL**
- **Toracoesternotomía transversa 4º eic.**
  - **2 Implantes pulmonares unilaterales**
- **TRASPLANTE BIPULMONAR EN BLOQUE**
  - **2 Neumonectomías**
  - **Resección AI, tronco AP y tráquea**
  - **CEC**
  - **Anastomosis (Tráquea, AI, AP)**

MOMENTOS CRÍTICOS INTRAOPERATORIOS

- 1. Paso de ventilación espontánea a mecánica
- 2. Colapso pulmonar
- 3. Clampaje arteria pulmonar
- 4. Revascularización

Criterios intraoperatorios de CEC

- Indice cardíaco < 2 l/min/m^2
- SVO_2 < 60 %
- Presión arterial media < 50-60 mmHg
- SaO_2 < 85-90 %
- pH < 7.00

HIPERTENSIÓN PULMONAR SEVERA

Patient no.	Gender	Age	Diagnosis	Technique	PAP mean/systolic	Follow up (months)
1	M	27 years	PPH	BLTX	80 /60	29
2	F	24 years	PPH	Split LTX	102/68	Died on POD 7
3	F	49 years	SPH after PTEA	BLTX	100/42	21
4	F	24 years	PPH	BLTX	147/84	20
5	F	34 years	PPH±PA	BLTX±PA repair	105/65	19
6	M	22 years	PPH	BLTX	121/87	19
7	F	24 years	PPH	BLTX with cadaveric lobes	78 /52	19
8	M	50 years	PPH	BLTX	70 /46	14
9	M	21 years	PPH±foramen ovale	BLTX±repair of foramen ovale	90 /70	13
10	M	28 years	PPH	BLTX	145/83	11
11	F	14 years	CF	BLTX	135/83	7
12	F	13 years	CF	BLTX	120/82	25
13	F	7 years	F due to GVH	BLTX with cadaveric lobes	105/72	17
14	F	33 years	PPH±foramen ovale	BLTX±repair of foramen ovale	85 /60	Died on POD 140
15	M	47 years	COPD	BLTX	70 /50	50
16	F	21 years	CF	BLTX	70 /43	5
17	F	45 years	CF	BLTX	100/43	4

Arpad Pereszlenyi. Bilateral lung transplantation with intra-and postoperatively prolonged ECMO support in patients with pulmonary hypertension. Eur. J. Cardiothorac. Surg. 2002; 21:858-863

ELSEVIER

European Journal of Cardio-thoracic Surgery xxx (2007) xxx–xxx

EUROPEAN JOURNAL OF CARDIO-THORACIC SURGERY

www.elsevier.com/locate/ejcts

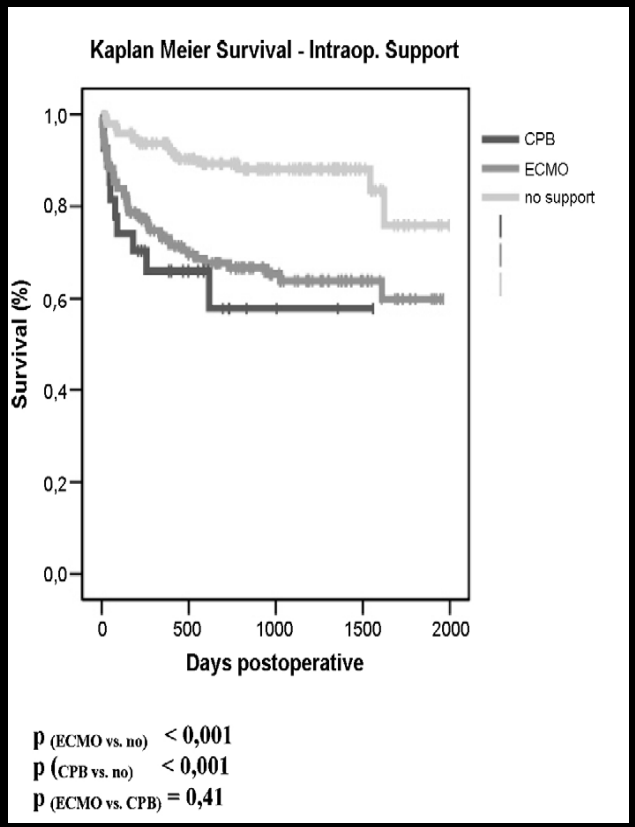
Institutional experience with extracorporeal membrane oxygenation in lung transplantation☆

Clemens Aigner, Wilfried Wisser, Shahrokh Taghavi, György Lang, Peter Jaksch, Damian Czyzewski, Walter Klepetko*

Department of Cardio-Thoracic Surgery, Medical University of Vienna, Waehringer Guertel 18-20, 1090 Vienna, Austria

Overview of ECMO and CPB use

	Bridge to TX	Intraoperative	Prolonged	Postoperative
⇨ ECMO	2	130	51	5
⇨ CPB+ECMO		27	0	11
⇨ No support		149	0	6



$p_{(ECMO\ vs.\ no)} < 0{,}001$

$p_{(CPB\ vs.\ no)} < 0{,}001$

$p_{(ECMO\ vs.\ CPB)} = 0{,}41$

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The Journal of Heart and Lung Transplantation
Volume 24, Number 10

J Heart Lung Transplant 2005;24:1454–59.

Report of the ISHLT Working Group on Primary Lung Graft Dysfunction Part II: Definition. A Consensus Statement of the International Society for Heart and Lung Transplantation

Jason D. Christie, MD, MS,[a] Martin Carby, MBBS, BSc,[b] Remzi Bag, MD,[c] Paul Corris, MB, FRCP,[d] Marshall Hertz, MD,[e] and David Weill, MD[f]

Table 5. Recommendations for Grading of Primary Graft Dysfunction (PGD) Severity

Grade	Pao_2/Fio_2	Radiographic infiltrates consistent with pulmonary edema
0	>300	Absent
1	>300	Present
2	200–300	Present
3	<200	Present

Whitson BA, Nath DS, Johnson AC, Walker AR, Prekker ME, Radosevich DM, et al. Risk factors for primary graft dysfunction after lung transplantation. J Thorac Cardiovasc Surg. 2006;131:73–80.

Factores donante

Liberación citokinas
Disregulación hormonal
Hipotensión
Embolismo graso
Lesion pulmonar por ventilador
Neumonía
Broncoaspiración

Factores receptor

Broncoaspiración
Sobrecarga líquidos
Lesión pulmonar por ventilador
HTP
Politransfusiones
Necesidad de CEC

Factores preservación injerto

DPI

ISQUEMIA REPERFUSION

Apoptosis
Liberación citokinas
Cambios metabólicos
Stress oxidativo

Activación complemento
Activación de mediadores (IL8, PAF,Endotelina-1…)
Activación leucocitos
Trombosis

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CLINICAL LUNG AND HEART/LUNG TRANSPLANTATION

Early Institution of Extracorporeal Membrane Oxygenation for Primary Graft Dysfunction After Lung Transplantation Improves Outcome

Christopher H. Wigfield, MD, FRCS,[a] Joshua D. Lindsey, MBS,[a] Thomas G. Steffens, CCP,[a] Niloo M. Edwards, MD, FACS,[a] and Robert B. Love, MD, FACS[b]

The Journal of Heart and Lung Transplantation
April 2007

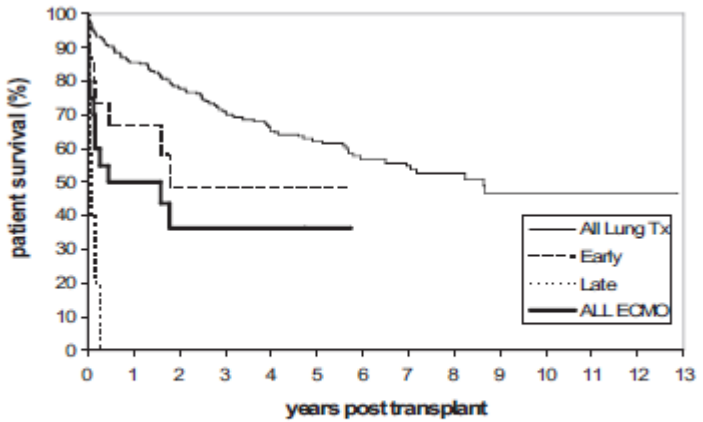

Figure 1. Kaplan–Meier survival curves. Extracorporeal membrane oxygenation support cohorts after lung transplantation with severe PGD compared with all lung transplant recipients without severe PGD.

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Medium-Term Results of Extracorporeal Membrane Oxygenation for Severe Acute Lung Injury After Lung Transplantation

P. S. Dahlberg, MD, PhD,[a] M. E. Prekker, BS,[a] C. S. Herrington, MD,[a] M. I. Hertz, MD,[b] and S. J. Park, MD[a]

Patient	Type of transplant	Recipient Dx	PA pressure	ECMO reason	ECMO days	Weaned	90-day survivor
1	SLT	COPD	25	IR	0 to 2	Yes	Yes
2	SLT	COPD	26	IR	0 to 9	Yes	No
3	SLT	IPF	25	IR	2 to 5	Yes	No
4	SLT	IPF	25	IR	7 to 12	No	No
5	SLT	IPF	39	IR	0 to 3	Yes	No
6	BLT	PPH	44	IR	0 to 2	Yes	Yes
7	BLT	CF	14	IR	1 to 2	Yes	Yes
8	BLT	CF	13	IR	0 to 2	Yes	Yes
9	BLT	PPH	73	IR	0 to 2	Yes	Yes
10	BLT	PPH	67	IR	0 to 3	Yes	Yes
11	BLT	Other	12	IR	0 to 3	Yes	Yes
12	BLT	PPH	65	IR	2 to 7	Yes	Yes
13	BLT	PPH	84	RV failure	1 to 7	Yes	Yes
14	BLT	COPD	30	IR	0 to 8	No	No
15	BLT	CF	16	Rejection	13 to 14	No	No

Dx, diagnosis; PA, pulmonary artery; ECMO, extracorporeal membrane oxygenation; SLT, single-lung transplant; BLT, bilateral-lung transplant; COPD, chronic obstructive pulmonary disease; IPF, idiopathic pulmonary fibrosis; PPH, primary pulmonary hypertension; CF, cystic fibrosis; IR, ischemia–reperfusion injury; RV, right ventricular.

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CME **CARDIOTHORACIC ANESTHESIOLOGY:**
The Annals of Thoracic Surgery CME Program is located online at http://cme.ctsnetjournals.org. To take the CME activity related to this article, you must have either an STS member or an individual non-member subscription to the journal.

Extracorporeal Membrane Oxygenation for Primary Graft Dysfunction After Lung Transplantation: Long-Term Survival

Christian A. Bermudez, MD, Prasad S. Adusumilli, MD, Kenneth R. McCurry, MD, Diana Zaldonis, MPH, BSN, Maria M. Crespo, MD, Joseph M. Pilewski, MD, and Yoshiya Toyoda, MD, PhD

Heart, Lung and Esophageal Surgery Institute, Division of Cardiothoracic Surgery, University of Pittsburgh, Pittsburgh, Pennsylvania

(Ann Thorac Surg 2009;87:854–60)

Table 1. Recipient Characteristics for Extracorporeal Membrane Oxygenator (ECMO) Support Patients After Lung Transplantation

ECMO Recipient Characteristics	Total ECMO	VA ECMO	VV ECMO	*p* Value*
Number	58	26	32	
Age years (median)	47 (47)	43 (40)	50 (54)	0.01
Sex (%)				0.30
Male	25	13	12	
Female	33	13	20	
Underlying disease				0.31
COPD	26	9	17	
Cystic fibrosis	11	7	4	
Pulmonary fibrosis	10	4	6	
PPH	6	3	3	
Other	5	2	3	
Type of transplant				0.59
Single right	10	4	6	
Single left	14	7	7	
Double lung	32	15	17	
Living related	2	0	2	
Ischemic time				0.09
Average in minutes	299	328	275	
Range	114–480	225–480	114–415	
Interval from lung transplantation to ECMO				
Mean	1 day	1 day	1 day	
Range	0–7 days	0–7 days	0–7 days	
Duration of support				0.65
Mean	5.5 days	4.6 days	5.6 days	
Range	1–20 days	1–11 days	1–20 days	
Weaned from ECMO	39	18	21	0.77
Duration of support (of patients weaned)				0.43
Mean	5.7 days	4.5 days	6.1 days	
Range	1–14 days	1–8 days	1–14 days	

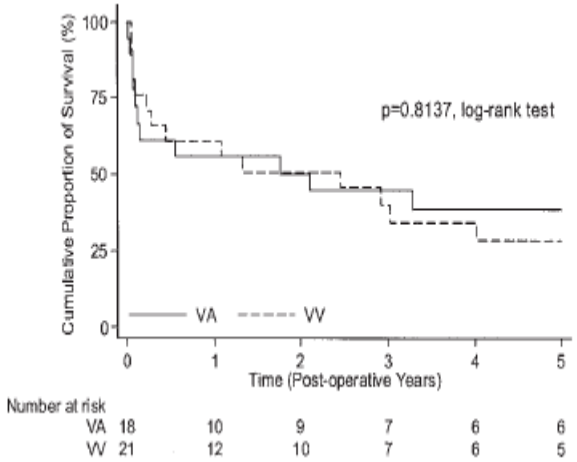

Table 4. Posttransplant Pulmonary Function Tests

	ECMO		Control	
	1 Year	2 Year	1 Year	2 Year
FVC	2.41	2.61	2.73	2.79
FEV_1	1.89	2.01	2.05	2.03
FEV_1/FVC	72.1	73.2	70	69.1

ECMO = extracorporeal membrane oxygenation; FEV_1 = forced expiratory volume in 1 second; FVC = forced vital capacity.

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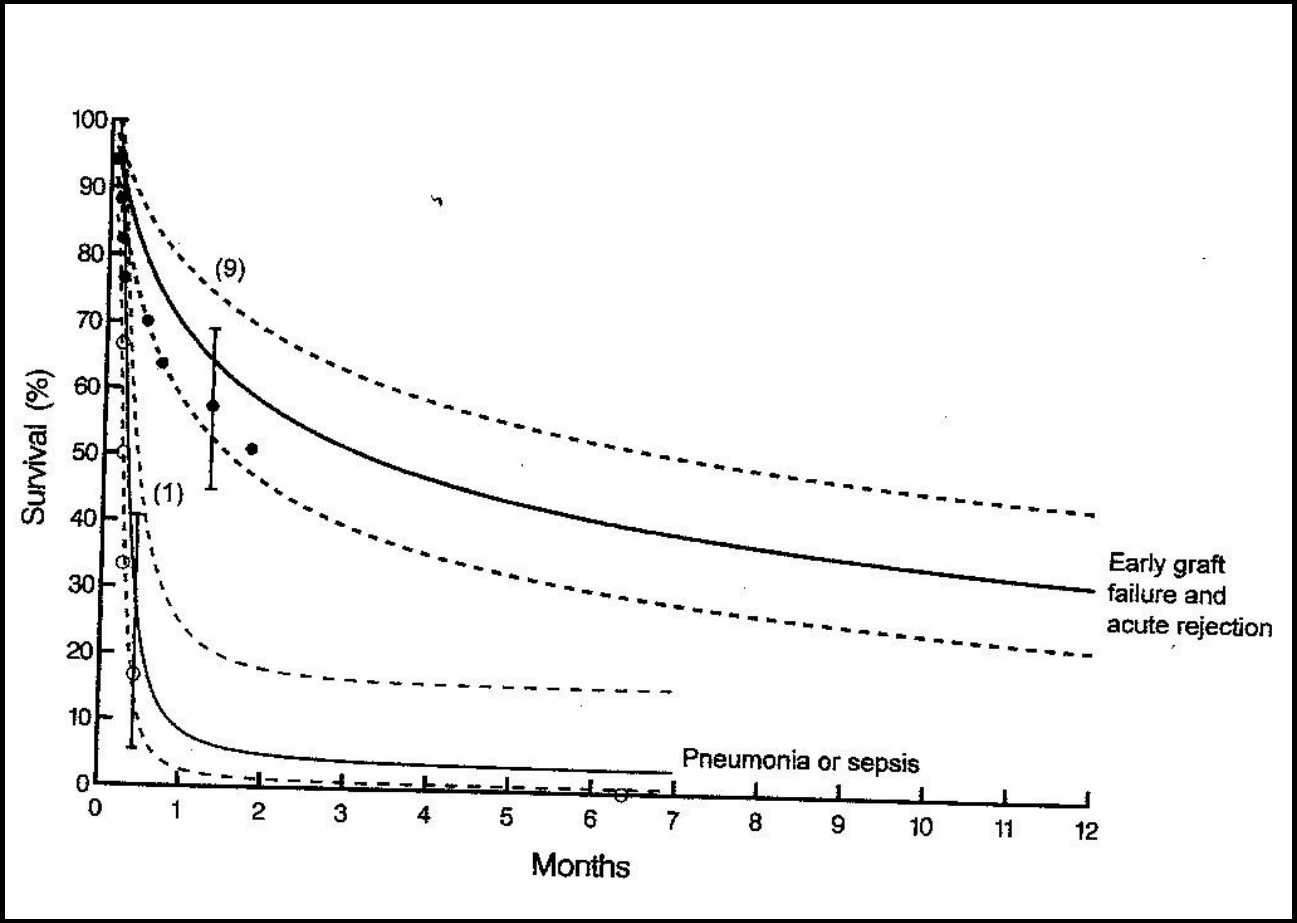

Mason D. Extended use of extracorporeal membrane oxygenation after lung transplantation. J. Thorac Cardiovasc Surg. 2006; 132:954-60

DPI. CASO CLÍNICO 1º

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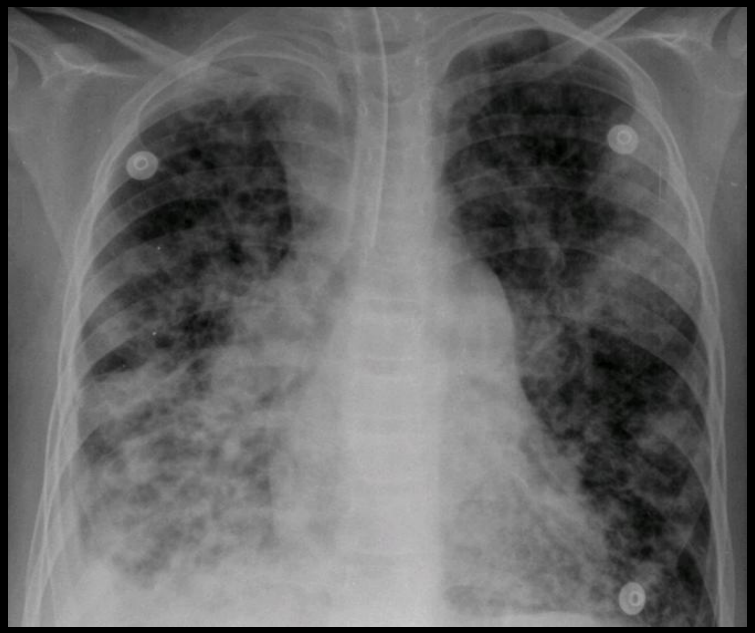
DPI: CASO CLÍNICO 1º

- Niña 9 años. FQ



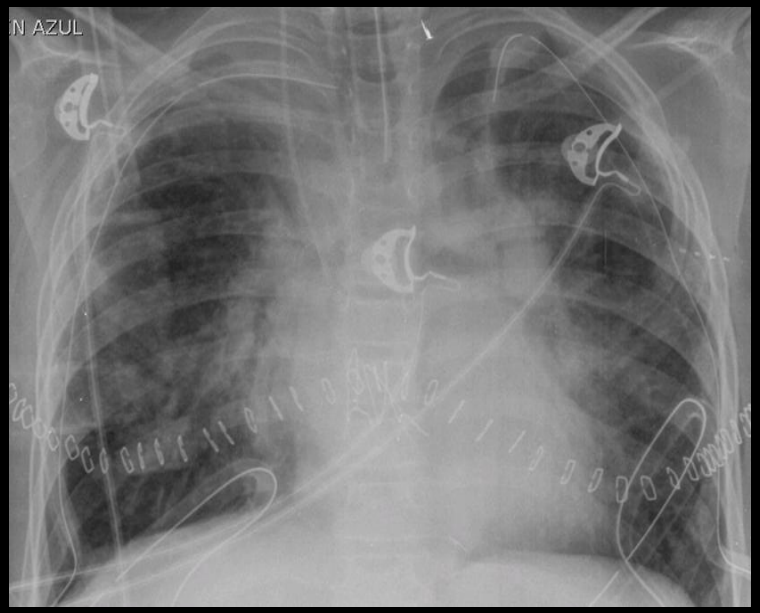
- Último ingreso en UCI por IR Global
- ($PaO_2/FiO_2$107, Pa CO_2 130).
- Inicio de FMO

- Puesta en Código URGENTE

TRASPLANTE PULMONAR

DPI: 1ER CASO CLÍNICO

- TBP + Lobectomía de ambos lóbulos inferiores por desproporción antropométrica.
- Entrada en CEC desde el inicio (435 minutos)
- Tº isquemia 1er pulmón 270 min y 325 min "



TRASPLANTE PULMONAR

DISFUNCIÓN PRIMARIA INJERTO

DPI : PaO_2/ FiO_2 56, $PaCO_2$84mmHg.

HTP severa, Fallo VD

Entrada en ECMO arterio-venoso (2l/m, ACT 170)

TRASPLANTE PULMONAR

DISFUNCIÓN PRIMARIA INJERTO

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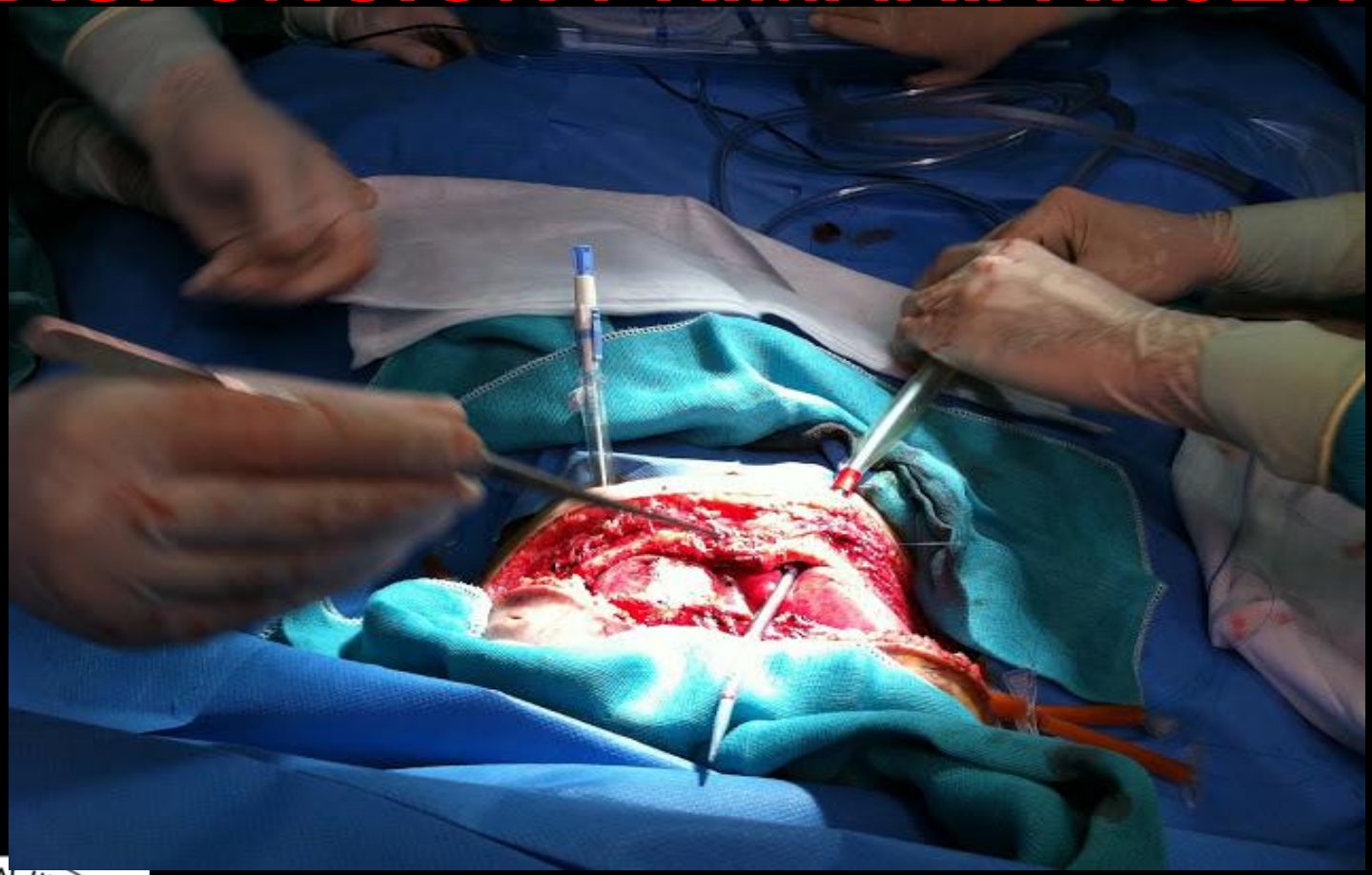
TRASPLANTE PULMONAR

DISFUNCIÓN PRIMARIA INJERTO



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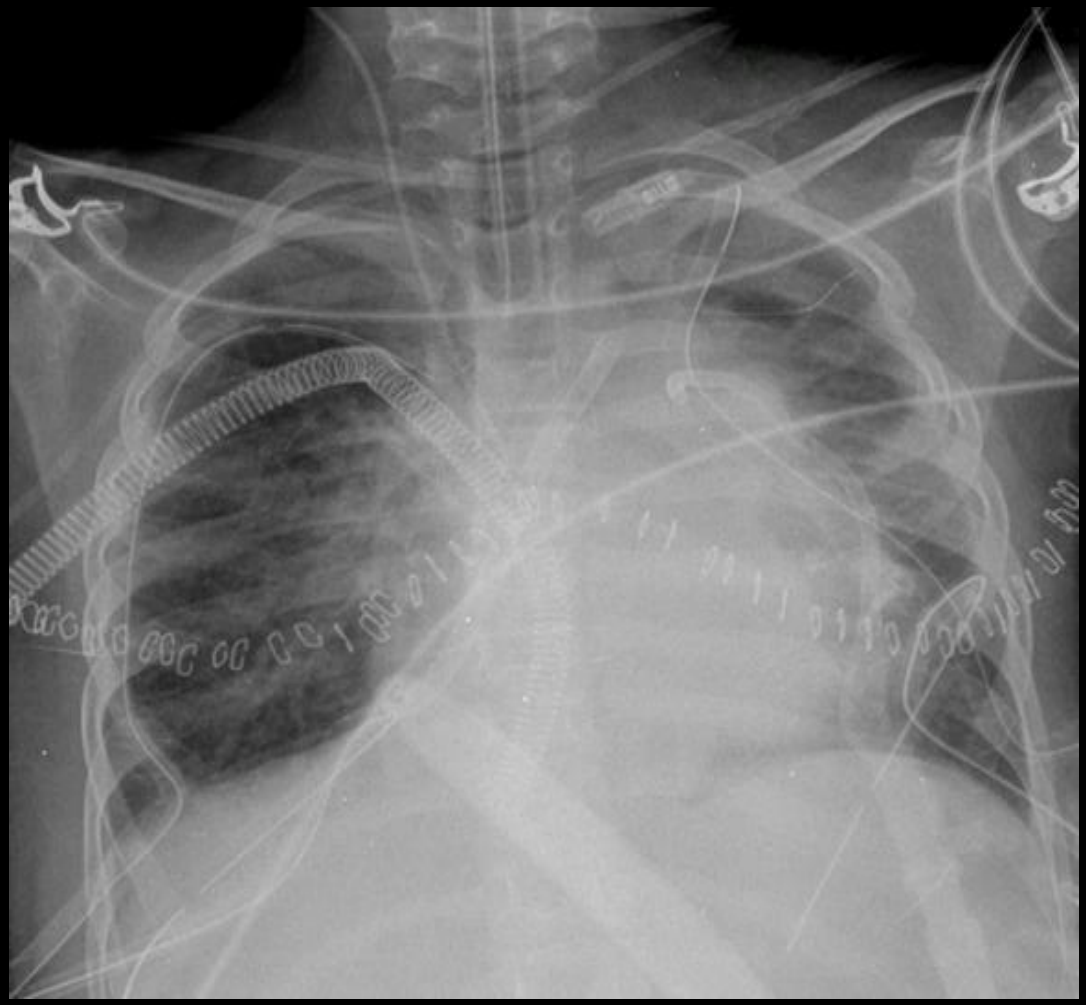
Mejoría en 24 h siguientes:
Disminución edema, inicio diuresis, descenso drogas



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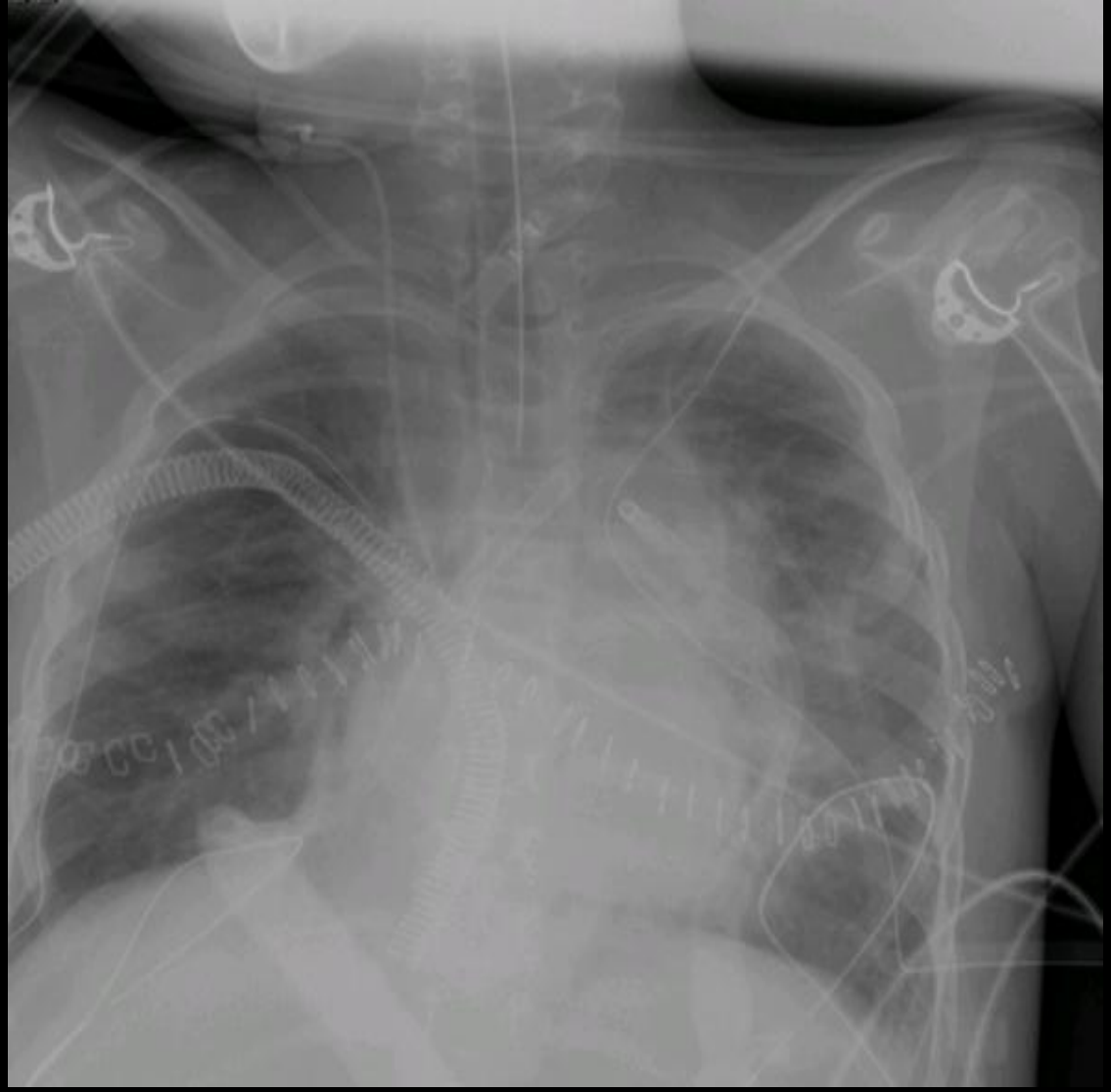

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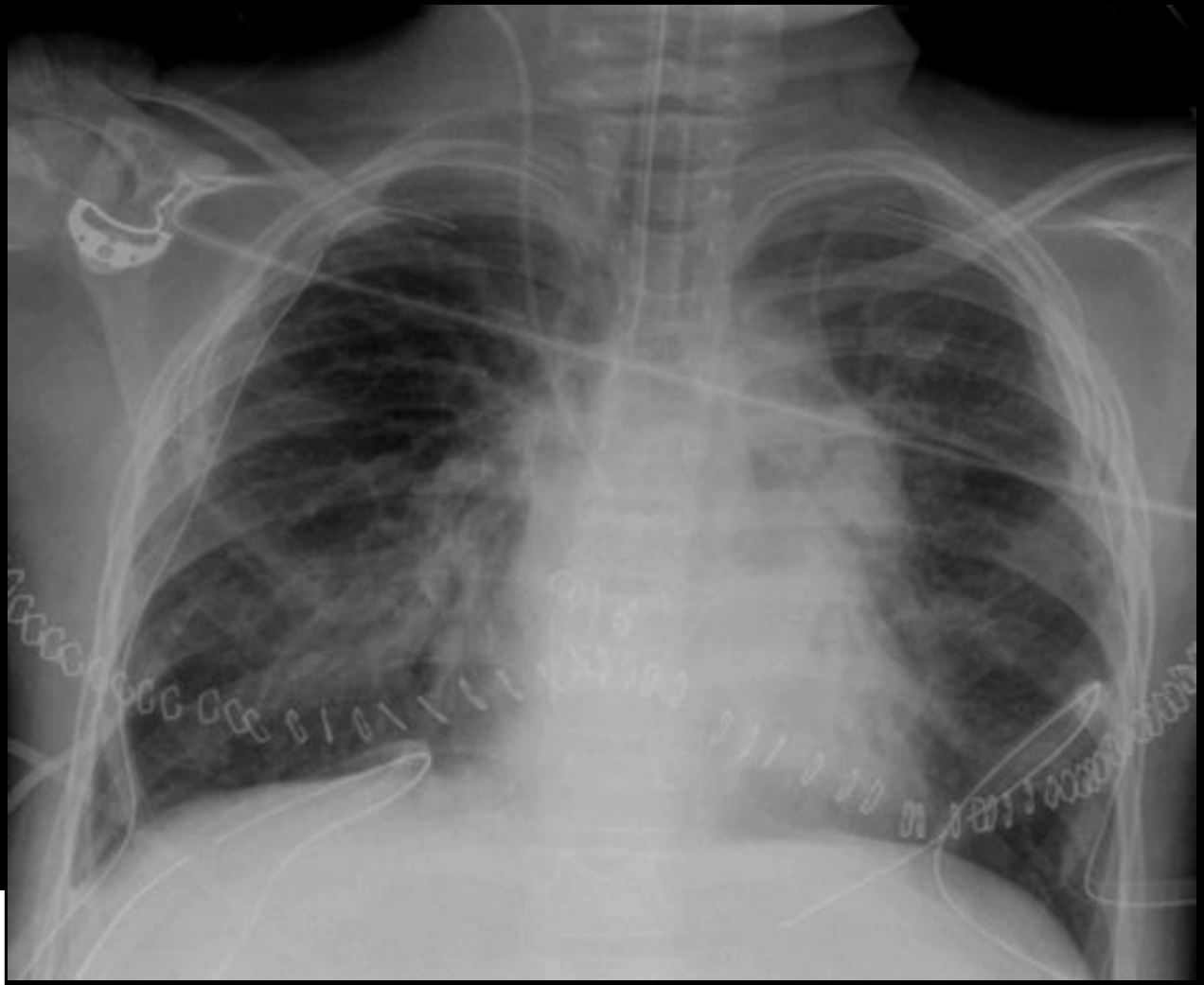
Retirada de ECMO al 5º dia



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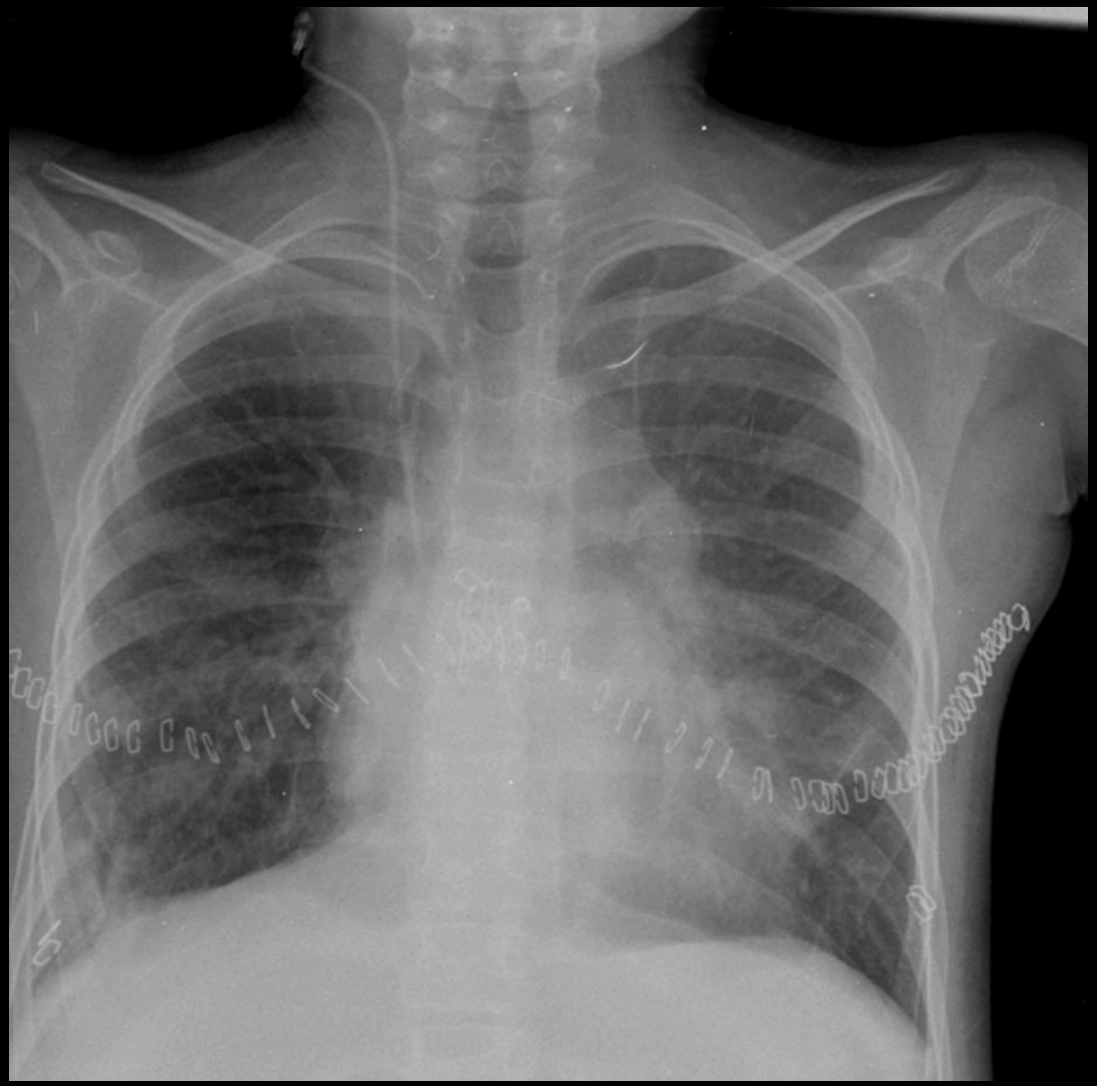
Extubada al 8º día con VMNI

Alta a planta



Rx tórax Pre-trasplante

Rx tórax actual

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DPI. CASO CLÍNICO 2º

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TRASPLANTE PULMONAR

CASO CLÍNICO 2º

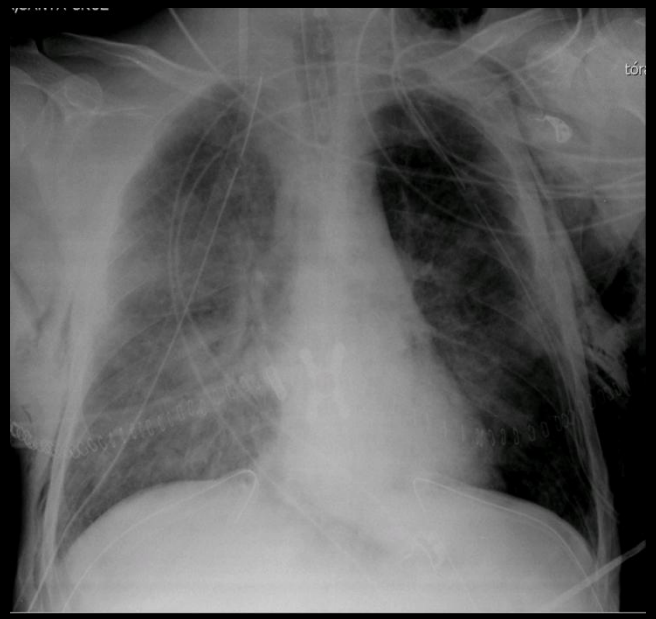
- Varón 36 años
- Diagnosticado de Histiocitosis X
- HTP severa . RAP 7,5 UW

TRASPLANTE PULMONAR
CASO CLÍNICO 2º

- En Reanimación:

Hipoxemia grave PaO_2/FiO_2 66/1

Salida de líquido edema por TET



TRASPLANTE PULMONAR

CASO clínico 2º

- Evolución 1os días:

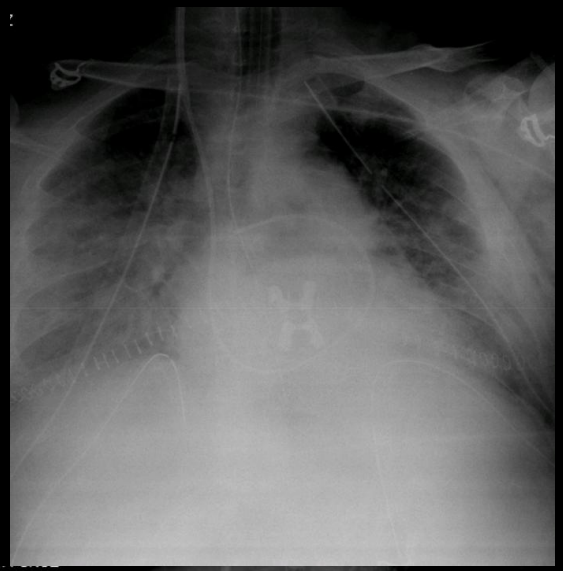
  Reducción parcial del edema

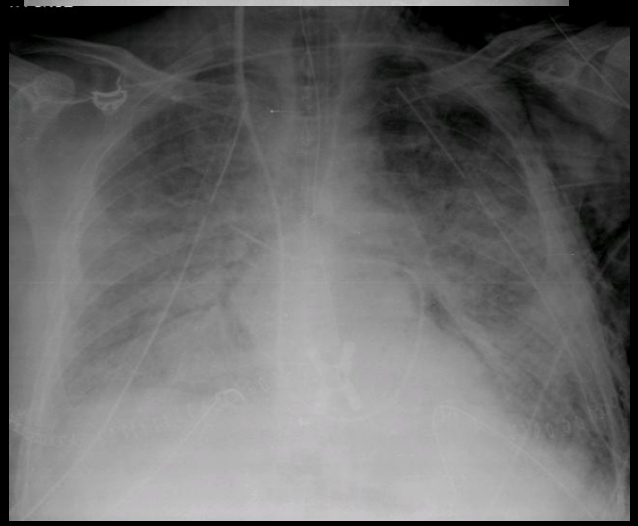
  $PaO_2/FiO_2 < 200$

  Sospecha de rechazo

  No respuesta choque de corticoides

Al 5º día entrada en ECMO venovenoso



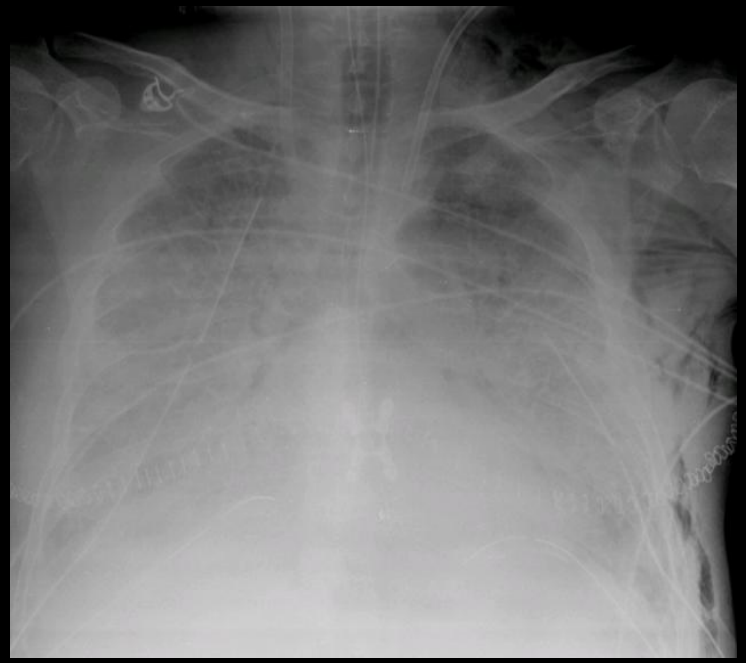


TRASPLANTE PULMONAR

CASO CLÍNICO 2º

- Confirmación del rechazo humoral

CÓDIGO Urgente ReTx



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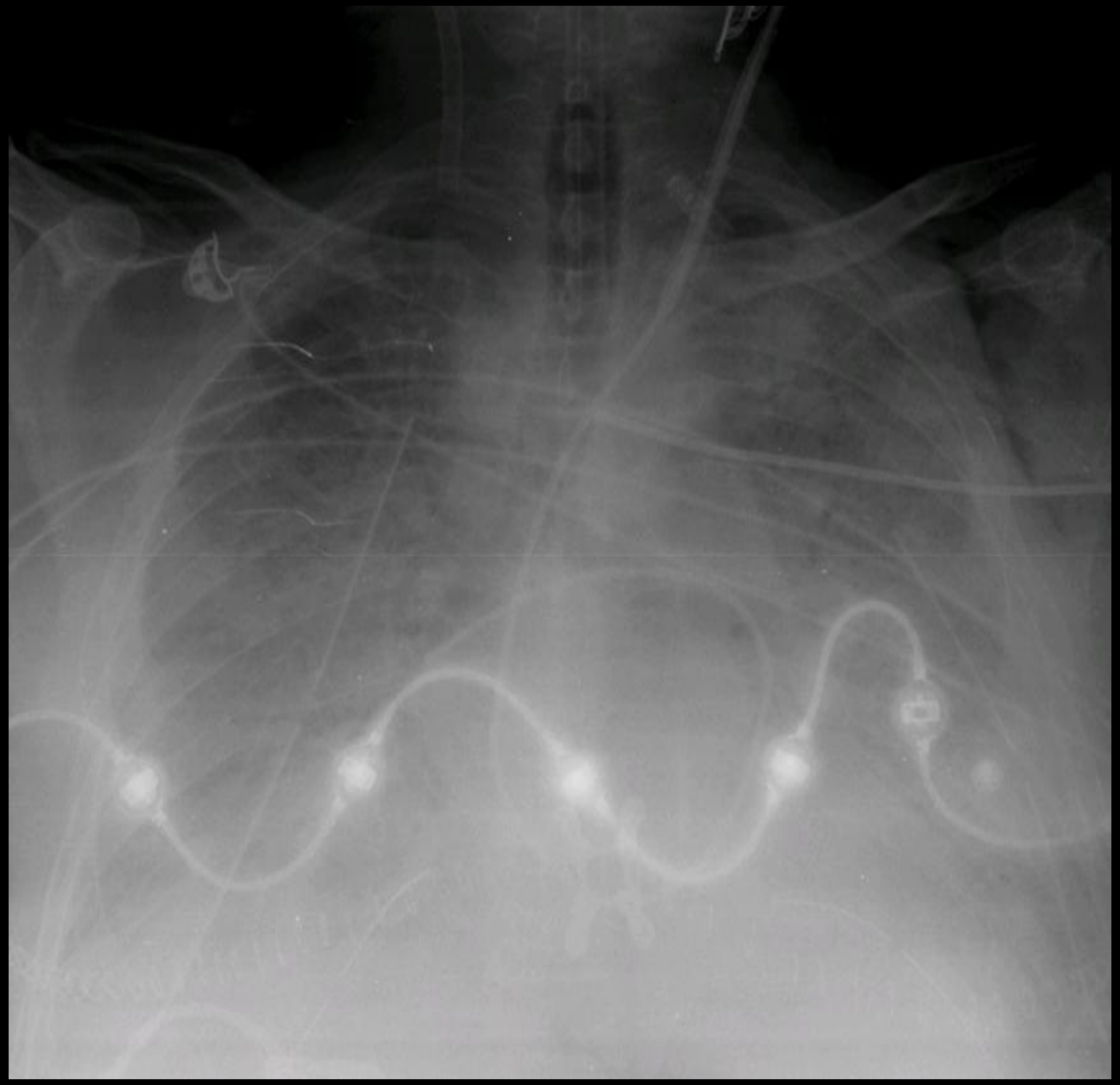

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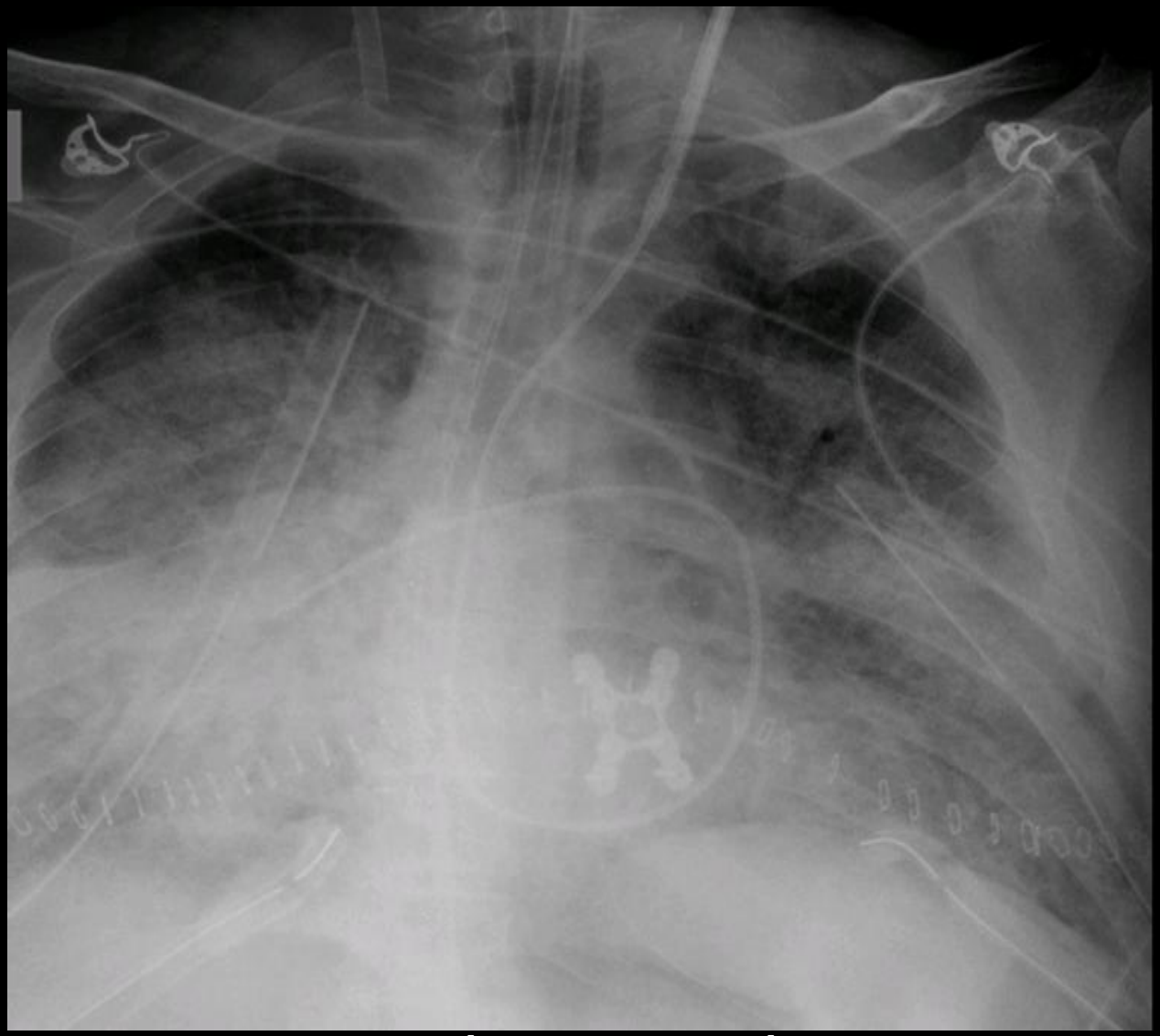
TRASPLANTE PULMONAR



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TRASPLANTE PULMONAR

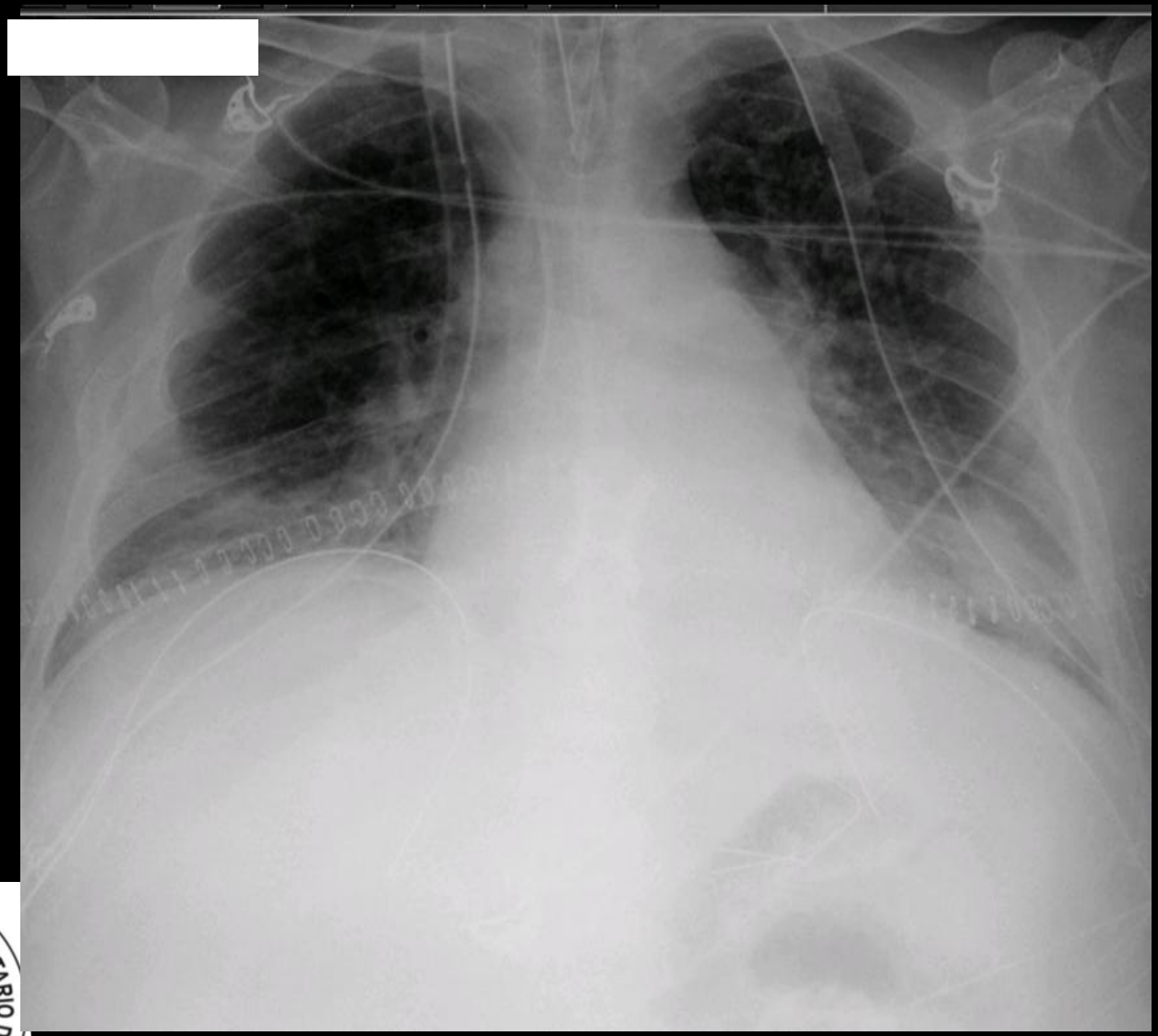
CASO CLÍNICO 2º

- Retrasplante a los: 19 días del 1er trasplante
  13 días de ECMO

En Q:

Tº isquemia 1erpulmón 230 minutos
" " 2º " 353 "

TRASPLANTE PULMONAR



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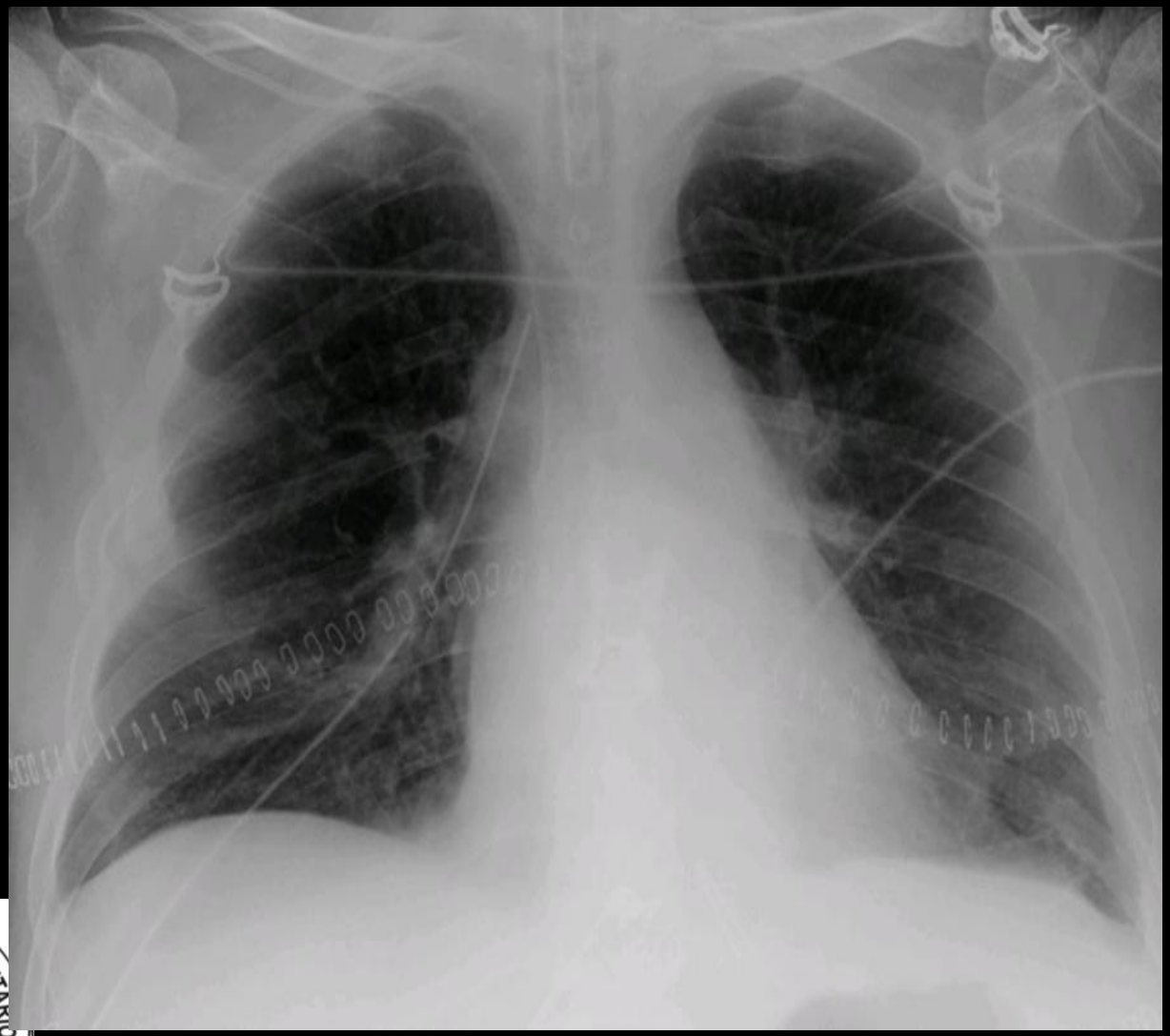
TRASPLANTE PULMONAR



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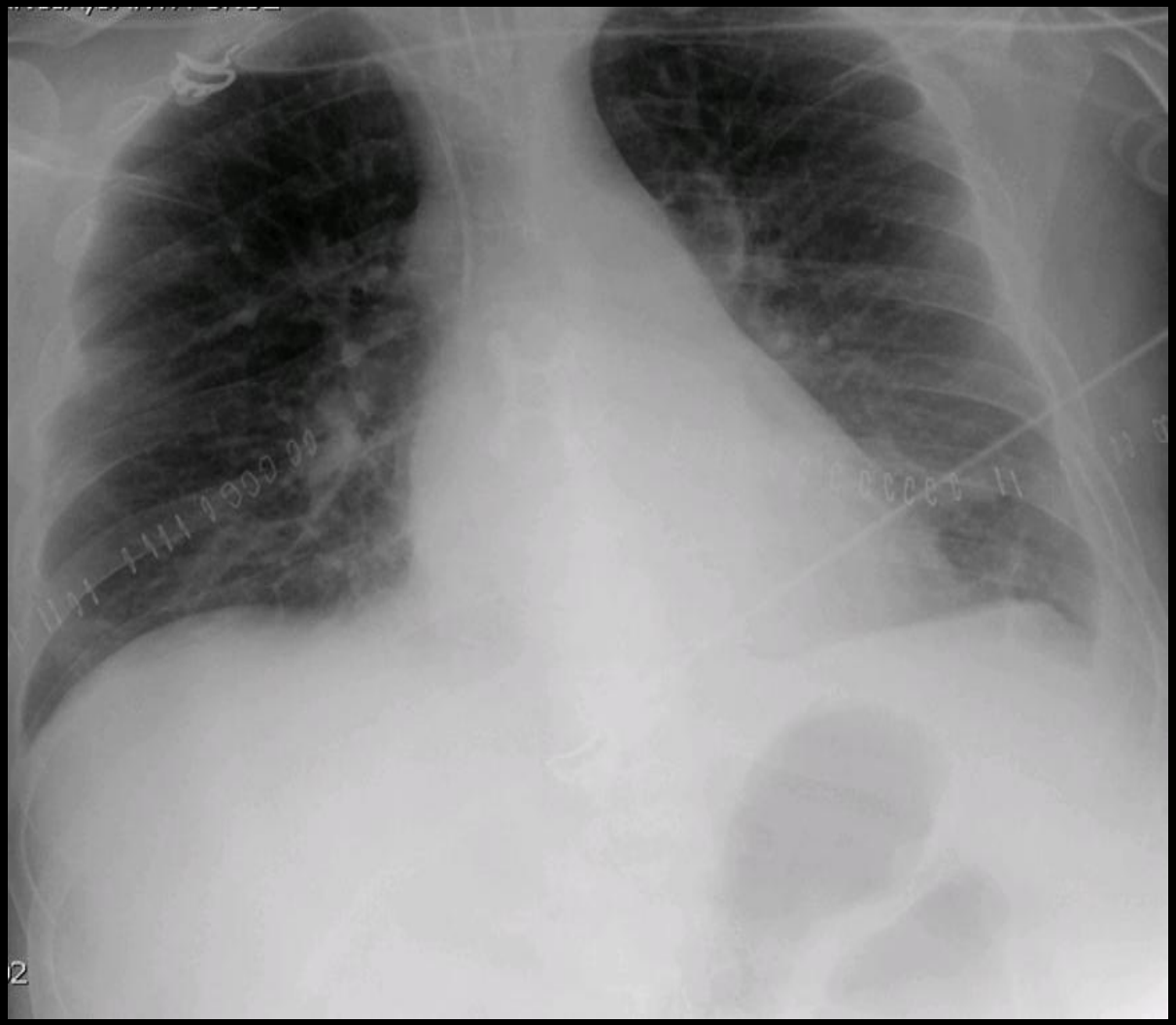

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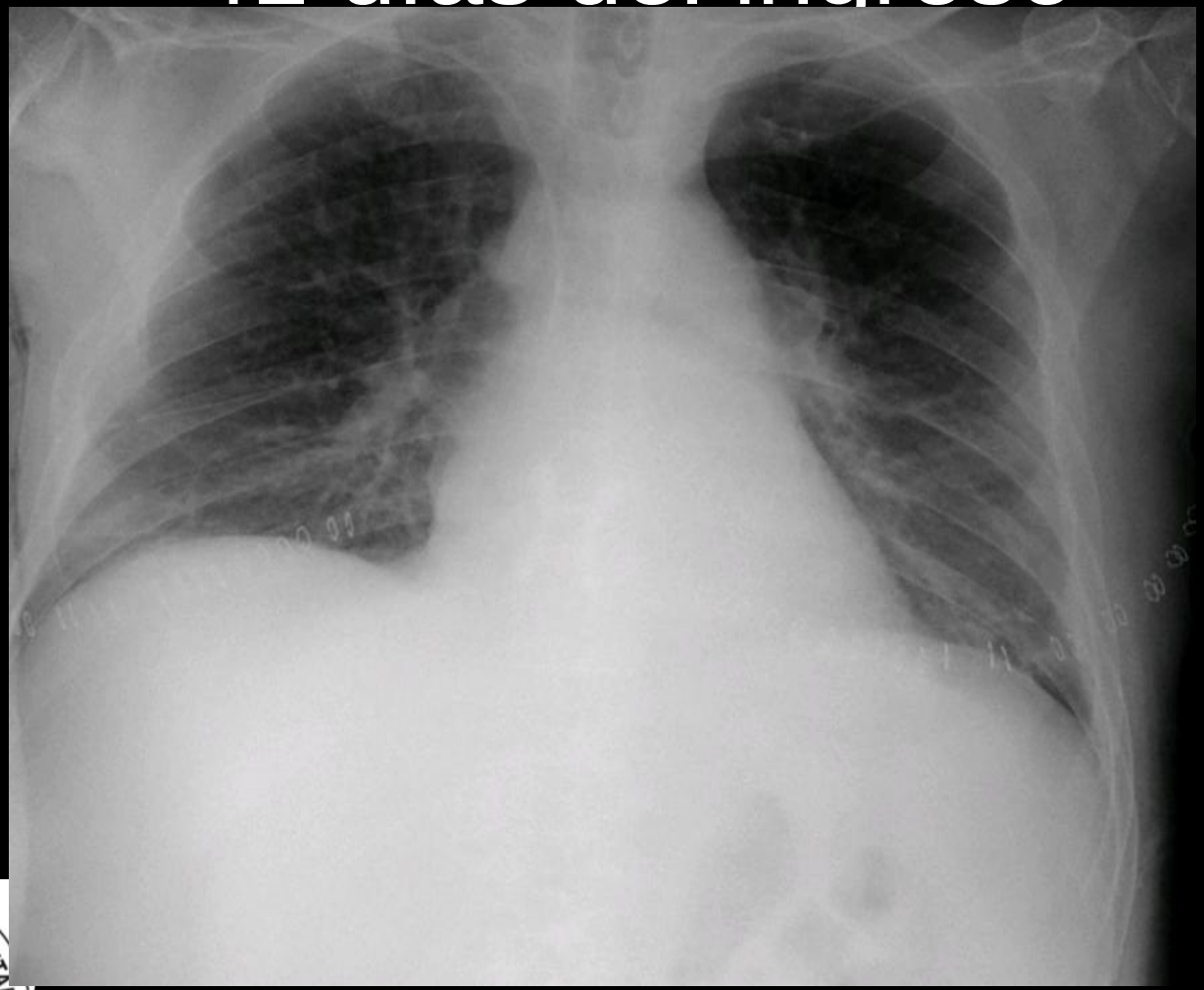
TRASPLANTE PULMONAR

CASO CLÍNICO 2º

- Persistencia hemorragia.
- Politransfusión sangre, hemoderivados.
- Deterioro transitorio f. renal. No HDFC
- Marcada miopatía
- Infección pulmonar

- Retirado de la v. mecánica a los 41 días del ingreso



Alta a planta

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