SCOMPENSO CARDIACO AVANZATO E TERAPIE SOSTITUTIVE LVAD O TRAPIANTO,
A CIASCUNO IL SUO

UTIC CLUB | ANMCO
CRITICAL CARE COMMUNITY

Terapia sostitutiva cardiaca-trapianto di cuore

- *Emilio Di Lorenzo*

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Ospedale Monaldi AOS dei Colli - Napoli

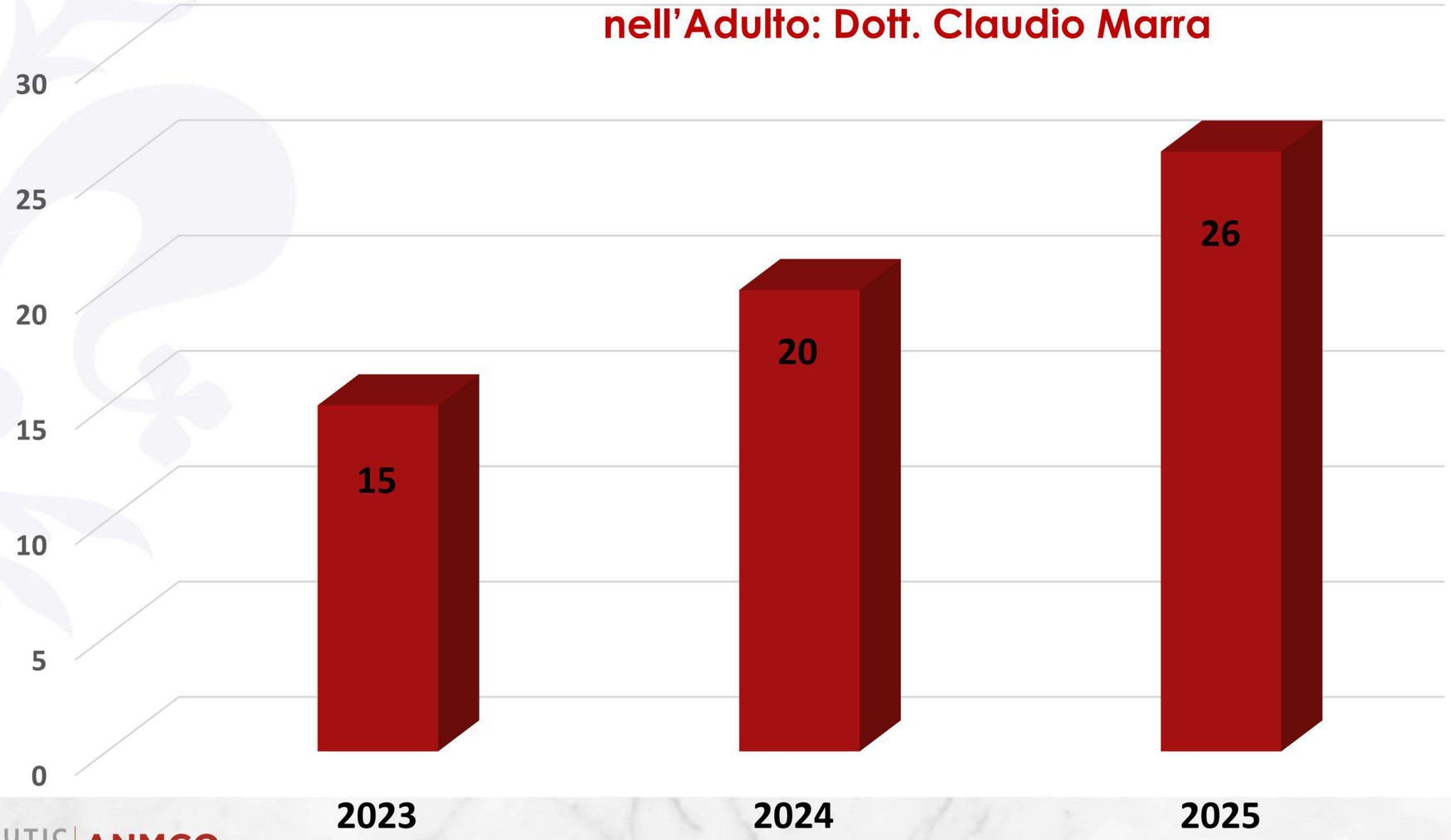
- *Biagio Liccardo*

Unità di Terapia Intensiva Cardiologica
Ospedale Monaldi/Vanvitelli- Napoli

OSPEDALI DEI COLLI
MONALDI - COTUGNO - C.T.O.
"AZIENDA OSPEDALIERA SPECIALISTICA DEI COLLI"
Monaldi - Cotugno - C.T.O.

ATTIVITA' CENTRO REGIONALE TRAPIANTO CARDIACO NELL'ADULTO
OSPEDALE MONALDI – A.O. dei Colli (Napoli)

Team Leader Programma Trapianti nell'Adulto: Dott. Claudio Marra



Mortalità 30 gg: 3.2%

Mortalità 1 anno: 11.4%

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31.10	Hospital admission
01.11	MOF (Renal Failure, High MELD, Lactates, High Pulmonary Resistances)

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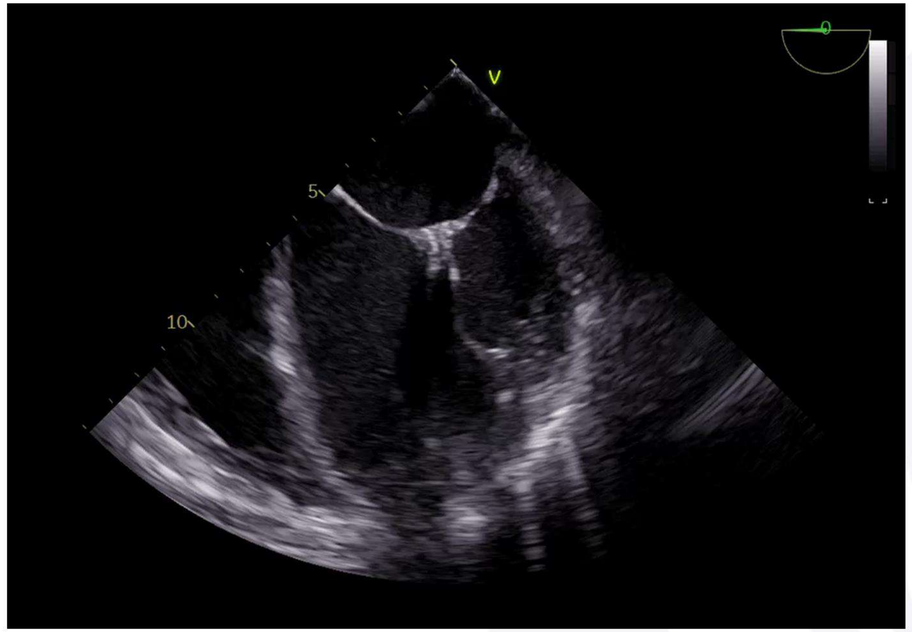
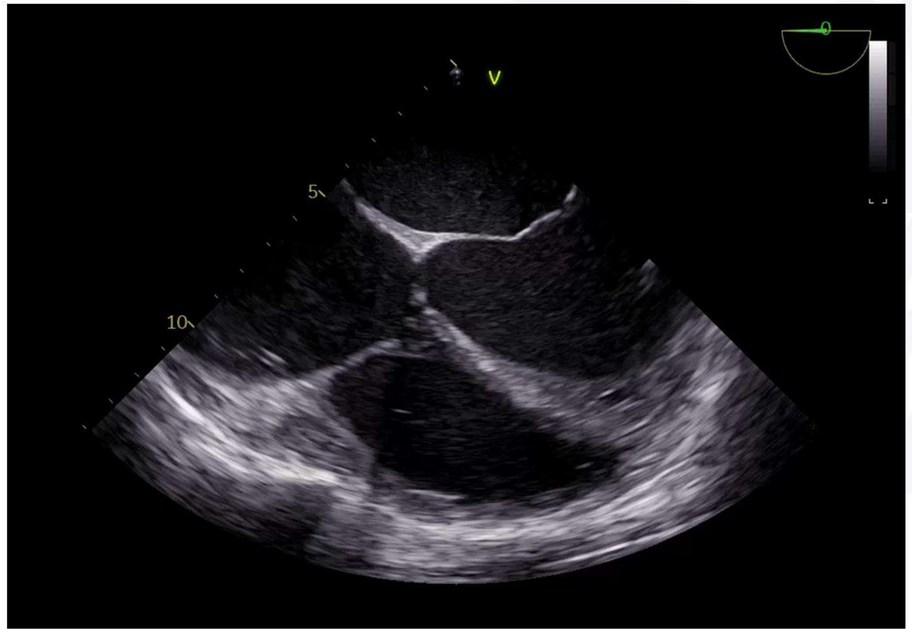




Centri SPOKE e Centri HUB (Shock Center) per lo Shock Cardiogeno

Tabella 10. Centri di riferimento per lo Shock Cardiogeno in Regione Campania

CENTRI SPOKE	SHOCK CENTER
P.O. di Ariano Irpino P.O. Di S. Angelo dei Lombardi P.O. Sacro Cuore di Gesù - Benevento A.O. San Pio di Benevento Clinica Montevergine - Mercogliano	A.O. Moscati di Avellino
P.O. San Giuseppe e Melorio - S Maria C/V P.O. San Rocco - Sessa Aurunca P.O. di Marcianise P.O. di Piedimonte Matese P.O. S. Giuseppe Moscati di Aversa Clinica Pineta Grande	A.O. S. Anna e S. Sebastiano di Caserta
P.O. Fatebenefratelli Fond. Villa Betania P.O. di Nola P.O. Ospedale del Mare P.O. S. Giovanni di Dio - Frattamaggiore P.O. San Giuliano – Giugliano A.O.R.N. Cardarelli	A.O.U. Federico II - Napoli
Clinica Mediterranea - Napoli C.D.C. Villa dei Fiori - Acerra P.O. San Leonardo - Castellamare di Stabia P.O. di Boscotrecase P.O. San Giovanni Bosco P.O. San Paolo P.O. dei Pellegrini P.O. di Sorrento P.O. Santa Maria delle Grazie - Pozzuoli	A.O. Dei Colli - P.O. Monaldi - Napoli
P.O. di Polla e Sant'Arsenio P.O. di Sapri P.O. di Sarno P.O. Di Battipaglia P.O. G. Fucito – Mercato San Severino P.O. S. M. dell'Olmo - Cava de' Tirreni P.O. Umberto I - Nocera Inf. P.O. Maria SS. Addolorata - Eboli P.O. S. Luca - Vallo della Lucania	A.O. U. S. Giovanni di Dio e Ruggi d'Aragona

REGIONE CAMPANIA

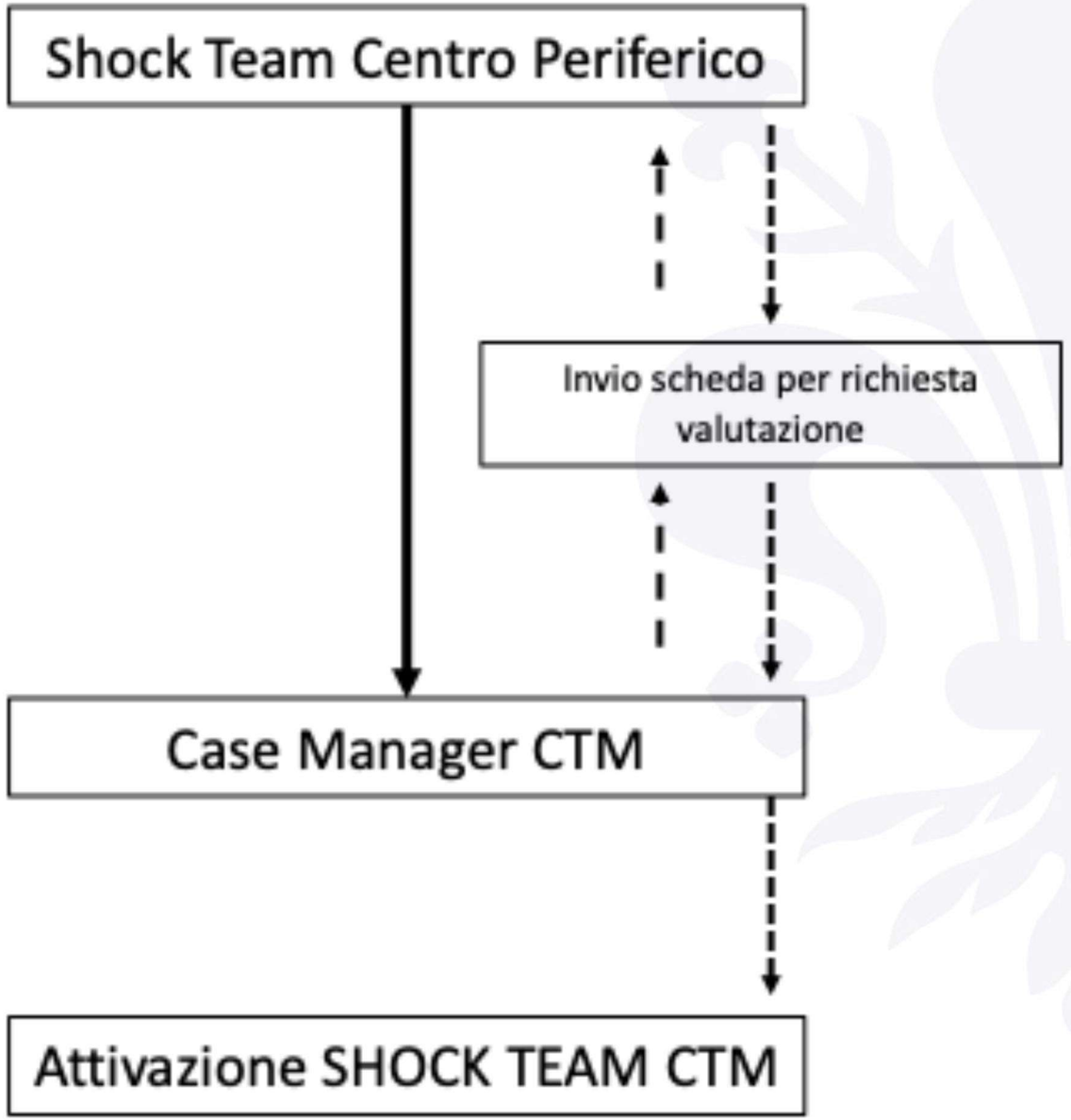
Piano regionale della rete dell'Infarto Miocardico Acuto (Rete IMA) e delle principali Emergenze Cardiovascolari

Il PDTA, approvato con Decreto n. 281 del 12/07/2022, identifica il percorso diagnostico-terapeutico per le sindromi coronariche acute complicate da shock cardiogeno. Si identificano con questo documento **i centri HUB ai quali i centri SPOKE dovranno fare riferimento** nel caso di IMA complicato da shock cardiogeno.

I centri SPOKE avranno l'obiettivo di:

- Sottoporre il paziente a monitoraggio continuo di FC, PA ed output urinario;
- Valutare il paziente con esame clinico ed esami strumentali (ECG, ecocardiogramma ove possibile) al fine di inquadrare la causa dello shock ed identificare la presenza di cause reversibili (ipovolemia, eventi aritmici, etc.);
- Fornire le prime cure (O2 o ventilazione meccanica, sollievo dal dolore, liquidi, inotropi e vasopressori per la stabilizzazione emodinamica);
- Riferire il paziente, ove non siano identificabili nell'immediato cause rimovibili e vi sia un margine di utilità un eventuale trattamento, al centro cardiologico Hub di riferimento, secondo le modalità e le tempistiche della gestione dei pazienti con SCA.

…….I centri Cardiologici che fanno parte della rete devono dotarsi di uno “SHOCK TEAM” che ha in carico il paziente potenzialmente candidabile a trattamenti sostitutivi i cui componenti devono essere gli interlocutori dello SHOCK TEAM del CTM che valuterà l'appropriatezza della proposta basandosi primariamente sulla compilazione di una scheda dedicata ed eventualmente con un teleconsulto …….



STRUTTURA A SUPPORTO DEL PROGRAMMA TRAPIANTO CARDIACO NEGLI ADULTI

CARDIOLOGIA

UTIC

U.O.S. SCOMPENSO CARDIACO

T-ZONE

U.O. TRAPIANTO CARDIACO ADULTI

CARDIOANESTESIA

ATTIVITA' CENTRO REGIONALE TRAPIANTO CARDIACO NELL'ADULTO

OSPEDALE MONALDI – A.O. dei Colli (Napoli)

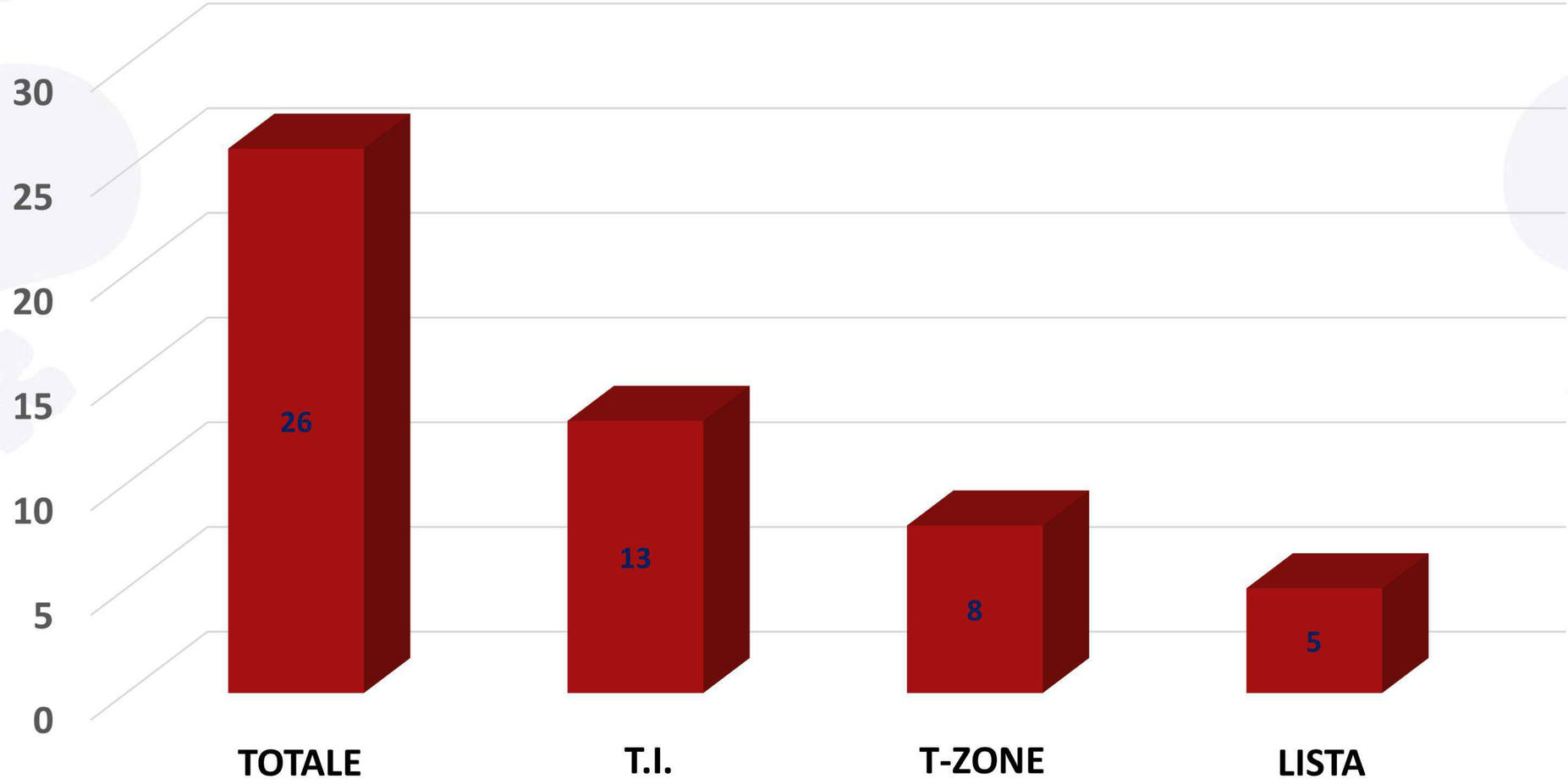


Tabella 3. Centri HUB della Rete IMA della Regione Campania, distinti per Macroarea territoriale, a regime

Macroarea	Centro HUB
Avellino Benevento	Azienda Ospedaliera San G. Moscati - Avellino*
	Presidio Ospedaliero Sant'Ottone Frangipane di Ariano Irpino - Avellino
	Azienda Ospedaliera San Pio - Benevento
Caserta	Azienda Ospedaliera Sant'Anna E San Sebastiano - Caserta*
	Presidio Ospedaliero San G. Moscati - Aversa
	Casa Di Cura Pineta Grande - Castel Volturno
Napoli 1 Centro	Presidio Ospedaliero Ospedale Del Mare - Napoli
	Azienda Ospedaliera A. Cardarelli - Napoli
	Ospedale dei Colli - Monaldi - Napoli*
	AOU Federico II - Napoli*
	Ospedale San Giovanni Bosco - Napoli
Napoli 2 Nord	Presidio Ospedaliero Santa Maria Delle Grazie – Pozzuoli
	Casa di Cura Villa dei Fiori - Acerra
	Ospedale dei Colli - Monaldi - Napoli*
	Presidio Ospedaliero San Giuliano - Giugliano in Campania
Napoli 3 Sud	Presidio Ospedaliero di Boscotrecase
	Presidio Ospedaliero S. Maria della Pietà - Nola
	Presidio Ospedaliero Ospedale Del Mare - Napoli
Salerno	A.O.U. S. Giovanni di Dio e Ruggi D'Aragona - Salerno*
	Presidio Ospedaliero Umberto I - Nocera Inferiore
	Presidio Ospedaliero Maria Ss. Addolorata – Eboli
	Ospedale San Luca - Vallo Della Lucania

REGIONE CAMPANIA

Piano regionale della rete dell'Infarto Miocardico Acuto (Rete IMA) e delle principali Emergenze Cardiovascolari

Centri HUB

I requisiti dei centri HUB sono quelli già indicati nel DCA n. 64/2018 e di seguito richiamati:

- operatività dell'Emodinamica H24, 365/365 giorni;
- volumi di PTCA (Percutaneous transluminal coronary angioplasty - Angioplastica Coronarica Percutanea Transluminale): minimo 250, ottimale 400/anno, il 30% dei quali per "angioplastiche primarie";
- almeno 3 operatori medici esperti (ottimale 5);
- dotazione strumentale: 2 angiografi (di cui almeno 1 fisso, dedicato) e disponibilità di contropulsatore aortico;
- elevata expertise clinica dell'UTIC (monitoraggio pressorio cruento, ultrafiltrazione continua, gestione di cateteri venosi centrali, ecocardiografia trans-esofagea).

REGIONE CAMPANIA

Centro Regionale Trapianti

Team Leader Programma Trapianti nell'Adulto: Dott. Claudio Marra

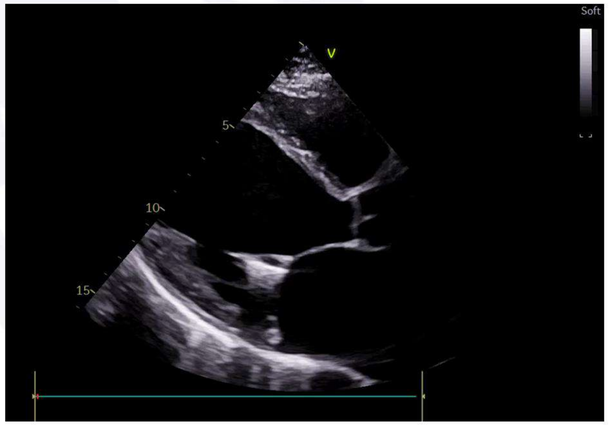
I Nodi della Rete sono:

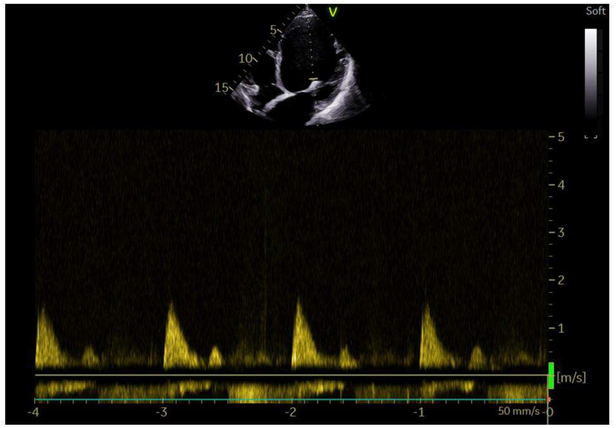
- **Centro Regionale Trapianti**
- **Centro Trapianti Monaldi (CTM)**
- **Cardiologie dotate di Emodinamica con e senza Cardiochirurgia (Centri HUB)**
- **Cardiologia senza Emodinamica (Centri Spoke)**
- **Rete Specialistica Ambulatoriale**
- **Medici di Medicina Generale**

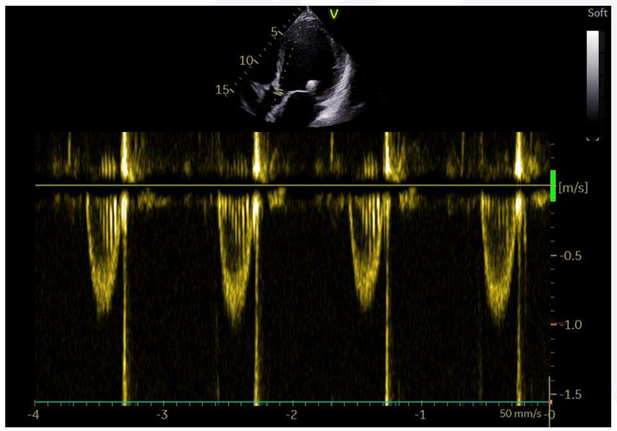
Patient Information	Age at submission	Sex	Weight (kg)	Height (cm)	BSA	BMI
	46	Man	95 kg	180 cm	2.18 m²	29.32 kg/m²

- B.D, Blood Group B
- Biventricular DCM in:
  - Max tolerated GDMT
  - S-ICD
  - M-TEER (2020)
  - history of illicit drug use and tobacco smocking
  - perianal abscess

2021







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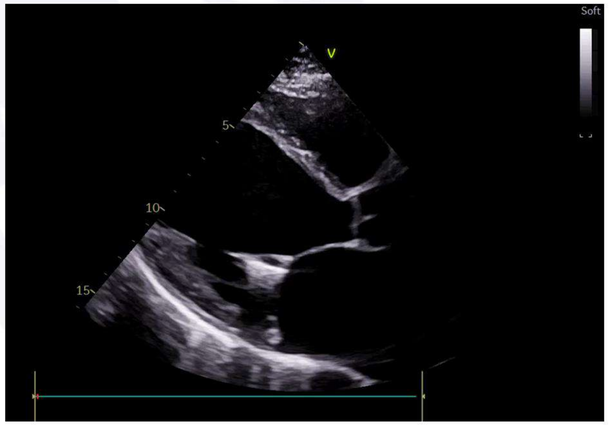
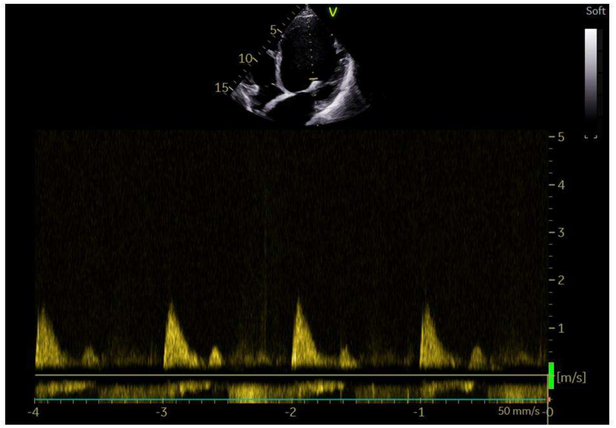
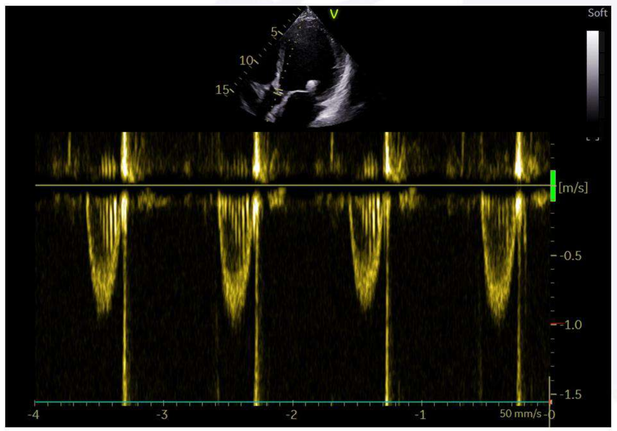
2021

SPO2 venosa centrale	61
EC	68
Pressione arteriosa	125/78
Atrio destro	8
Ventricolo destro	60/5
Arteria polmonare tronco (S/D/M)	58/24/37
Wedge (media)	24
Resistenze polmonari arteriolari (UW)	2.5
Gittata cardiaca (L/min)	5.3
Gittata cardiaca indicizzata (L/min/m^2)	2.6







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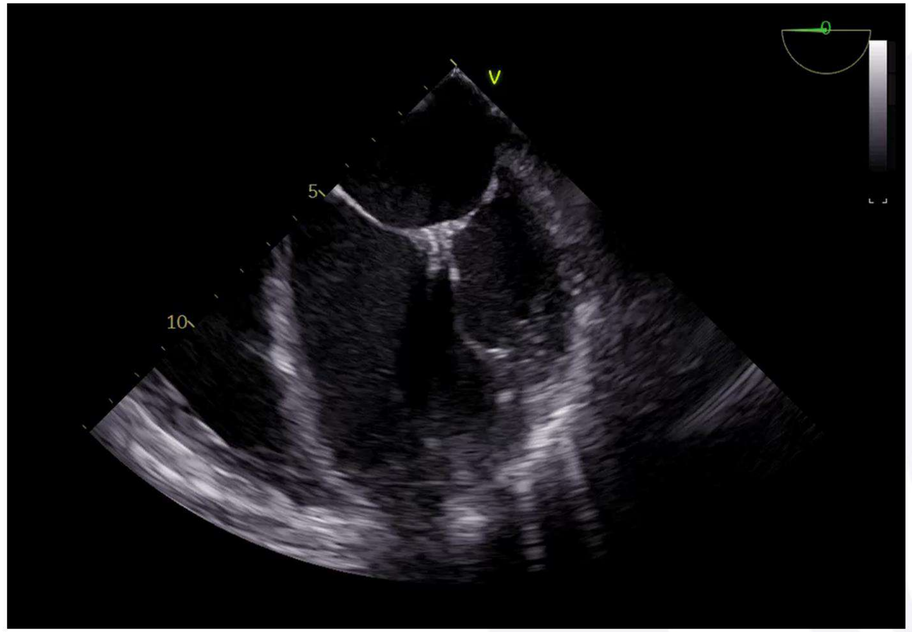
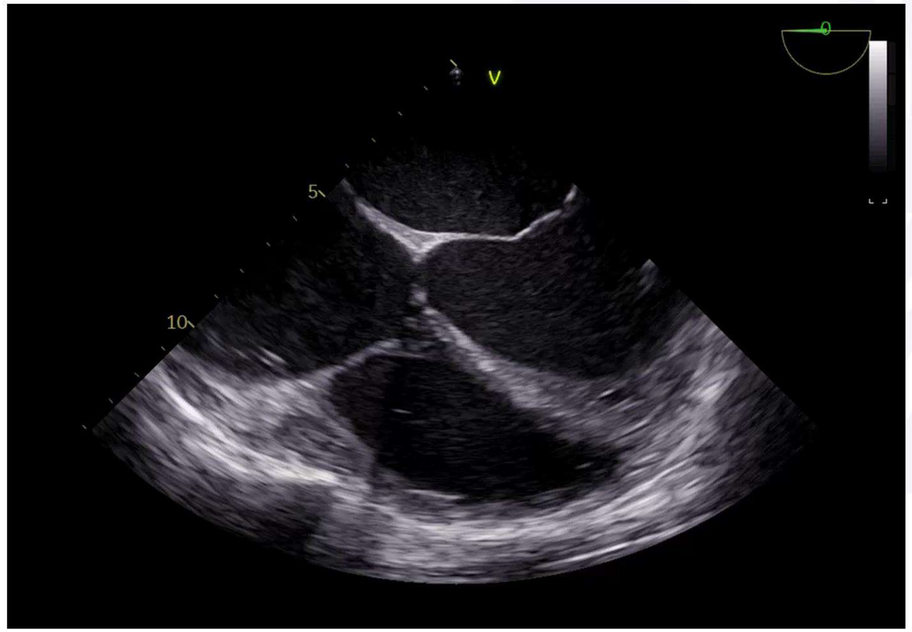
cPAP (5cmH2O)+ SNP 0.3y +Landiolol 2 y/Kg/m,
Lasix 250 mg ic

Ineffective CV attempts

Amiodarone 0.6 mg/kg/m (stop shock liver)





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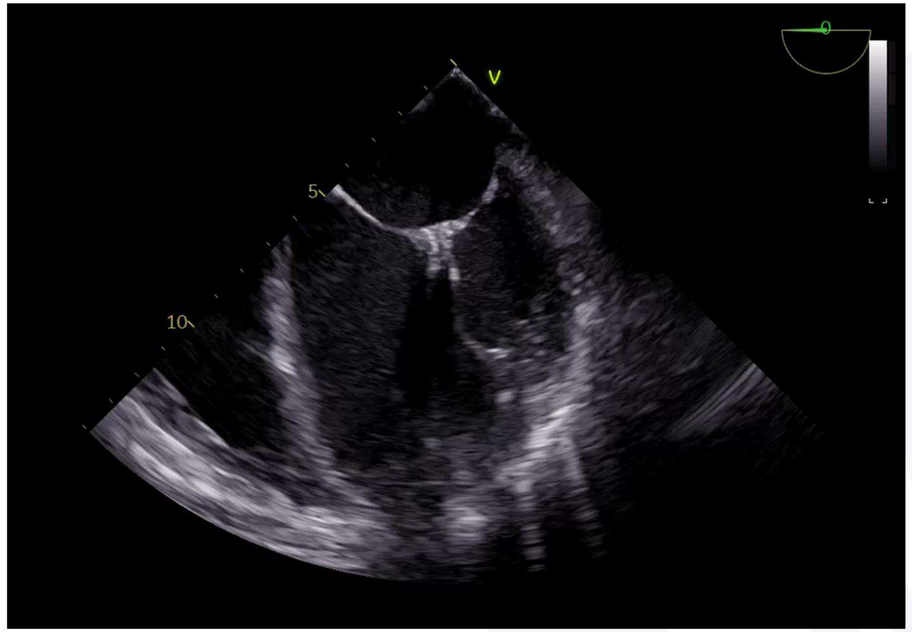
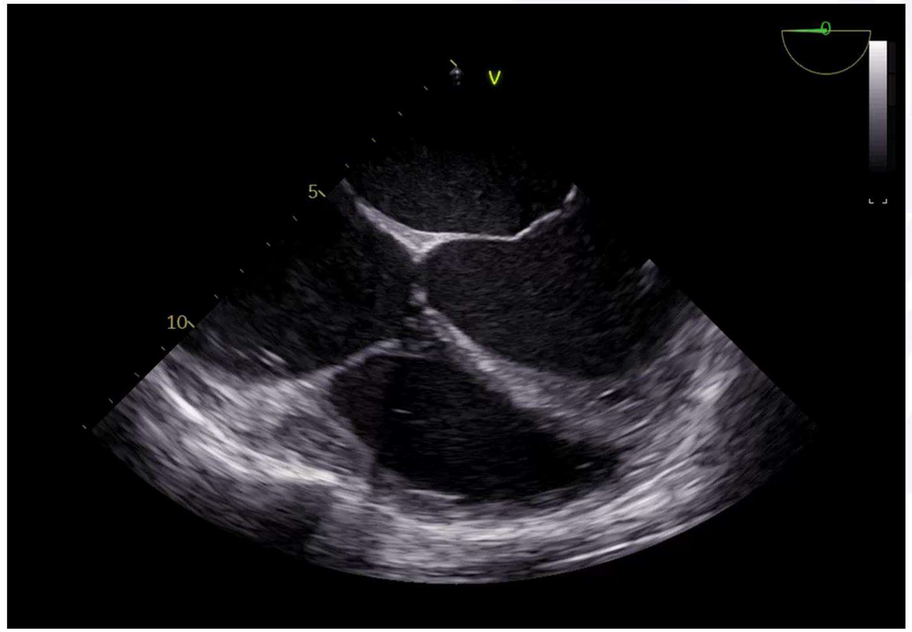




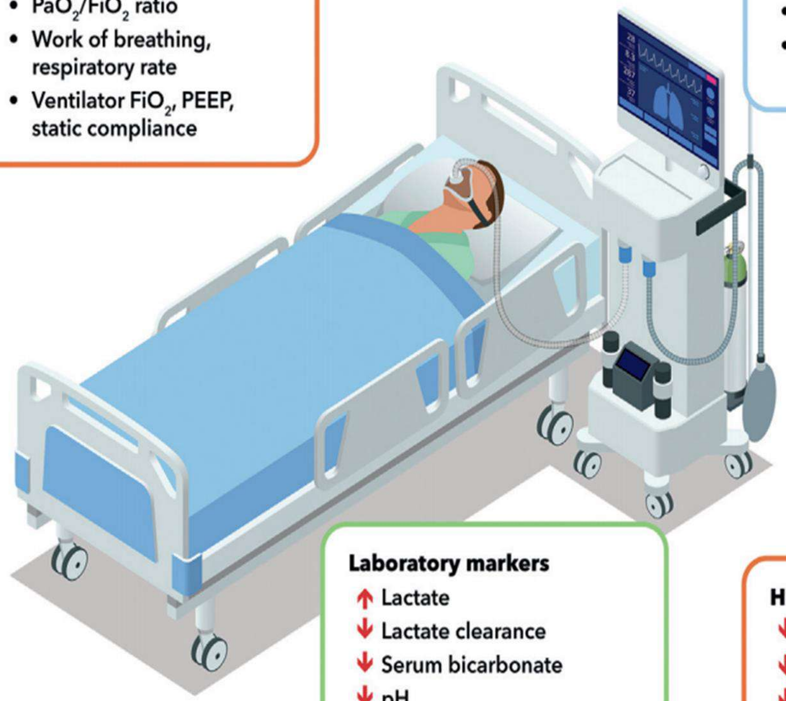
2025 Concise Clinical Guidance: An ACC Expert Consensus Statement on the Evaluation and Management of Cardiogenic Shock

Electrocardiography
- ECG monitoring
- Atrial fibrillation
- Ventricular arrhythmias

Respiratory
- Oxygen saturation (SpO_2 and PaO_2)
- PaO_2/FiO_2 ratio
- Work of breathing, respiratory rate
- Ventilator FiO_2, PEEP, static compliance

tMCS
- Device-specific monitoring

Neurologic
- Mental status
- Glasgow Coma Scale
- Delirium
- Cerebral saturation (ECMO only)



Echocardiography
- LV and RV size and function
- Valvular abnormalities
- Noninvasive filling pressure estimates

Renal markers
- ↓ Urine output

Physical exam
- ↑ HR
- ↓ BP, MAP
- ↑ JVP, HJR
- "Cold" extremities

Laboratory markers
- ↑ Lactate
- ↓ Lactate clearance
- ↓ Serum bicarbonate
- ↓ pH
- ↑ ALT, AST
- ↑ BUN, Cr

Hemodynamics
- ↓ $ScvO_2/SvO_2$
- ↓ CI
- ↓ PAPi
- ↑ RAP/PCWP

Referral INTERMACS 1-3

↓

Monitoraggio con CVC/PA/Diuresi h Eco(cardio) seriato

↓

Ipoperfusione +/- congestione

↓

Identificazione VAC non invasiva e compensazione con inodilatatori/inopressori

↓

Posizionamento MSC in funzione al profilo emodinamico

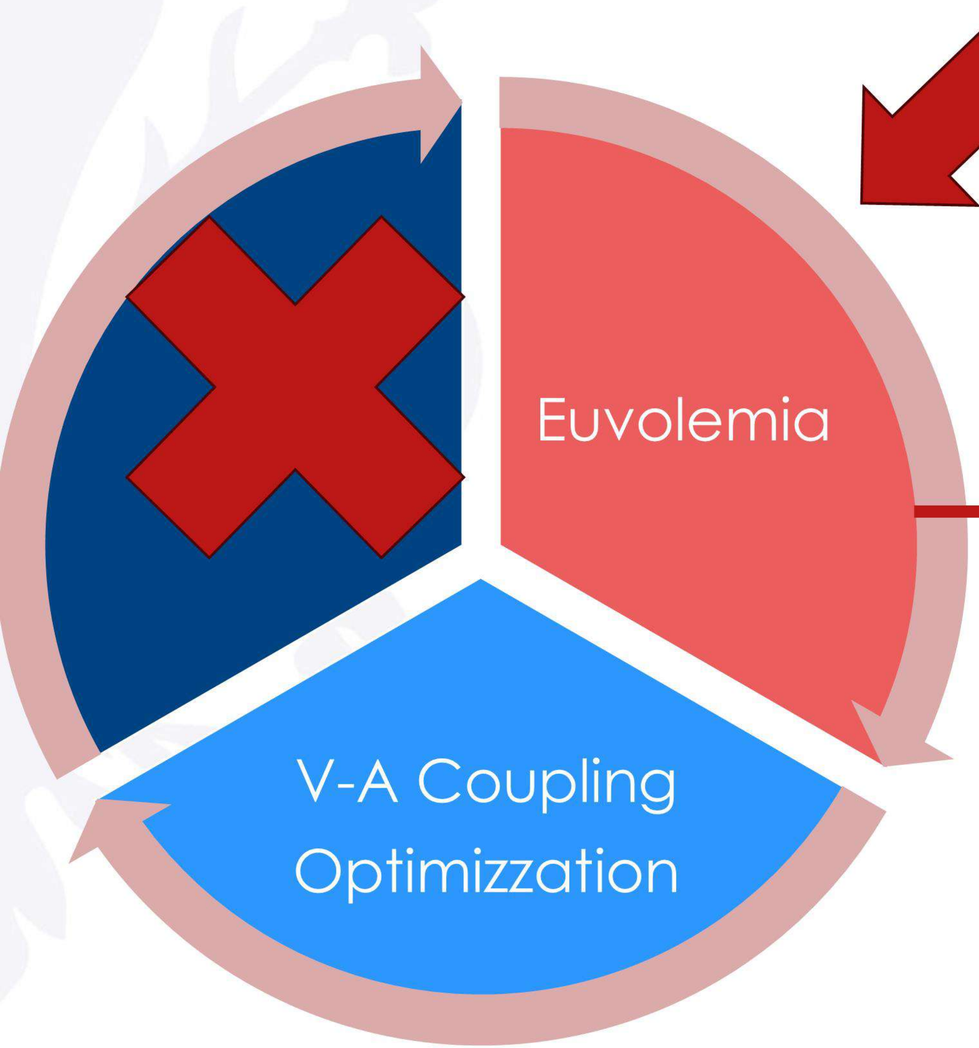
↓

PAC in ausilio per descalation/esclation

Heart Team

ESC European Society of Cardiology
European Heart Journal - Imaging Methods and Practice (2026) 4, qyaf147
https://doi.org/10.1093/ehjimp/qyaf147
REVIEW

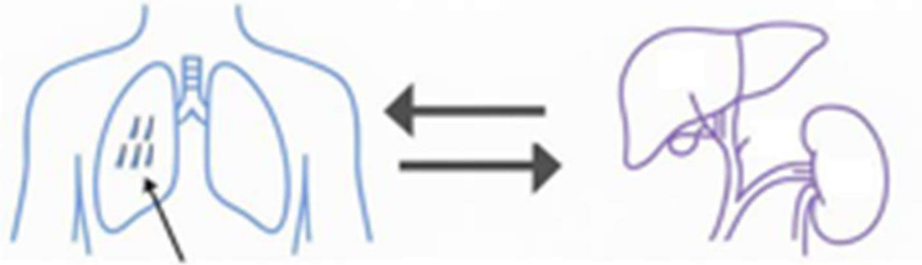
The rise of point-of-care ultrasound in cardiopulmonary diagnostics



MCS

Lung congestion
Left-sided pressure

Systemic venous congestion
Right-sided pressure



≥8 B-lines - LVFP ≥ 20 mmHg
AUC = 0.936

VExUS 2-3 - RAP ≥ 12 mmHg
AUC = 0.99

LUS

Improves Killip-based risk stratification

Absence of B-lines ("dry lungs") shows 98.1% NPV for in-hospital mortality

LUS + LVOT-VTI

Improves early risk stratification in STEMI beyond LUS alone

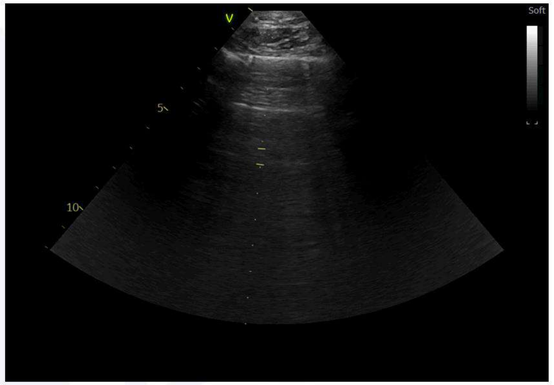
LUV classification

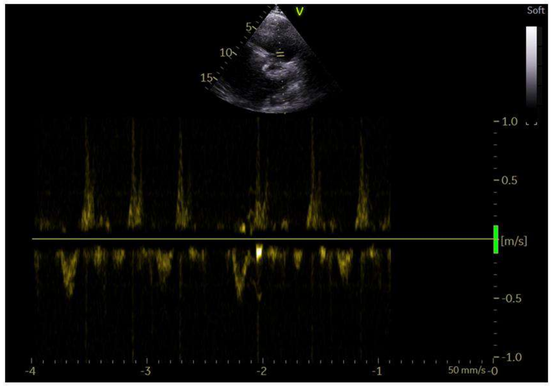
< 3 zones LVOT-VTI > 14	A	In-hospital mortality: 0% CS in 24h: 0%
≥ 3 zones LVOT-VTI > 14	B	In-hospital mortality: 3% CS in 24h: 5%
< 3 zones LVOT-VTI ≤ 14	C	In-hospital mortality: 12% CS in 24h: 12.5%
≥ 3 zones LVOT-VTI ≤ 14	D	In-hospital mortality: 45% CS in 24h: 30.8%

VExUS

VExUS ≥1 associated with higher in-hospital mortality and reduced cardiac index

Higher VExUS grades predict increased risk of AKI





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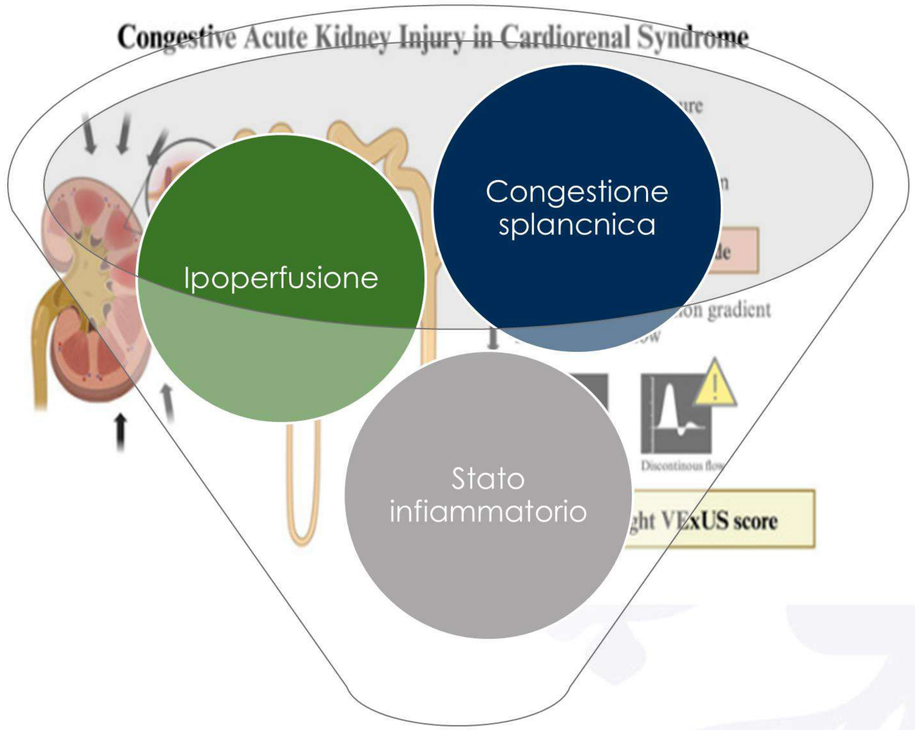
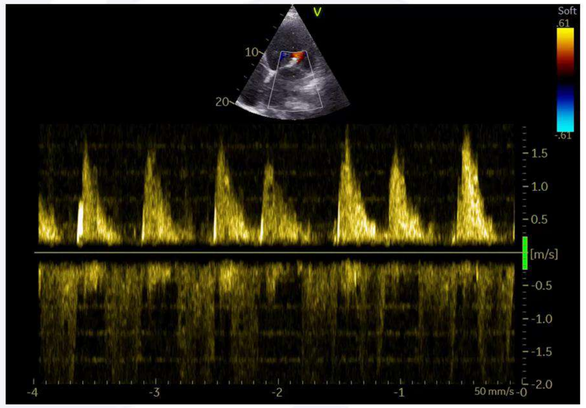
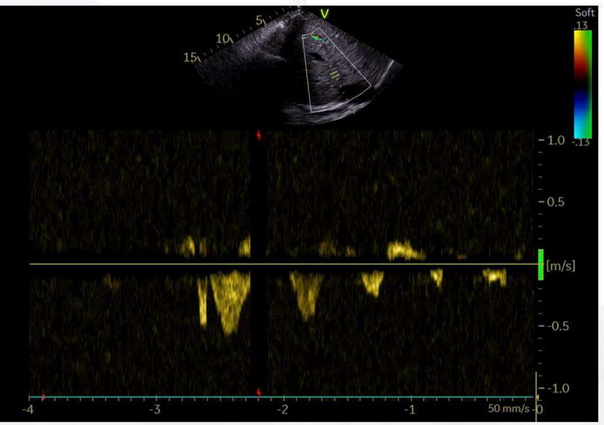
VExUS Protocol Along Cardiorenal Syndrome: An Updated Review

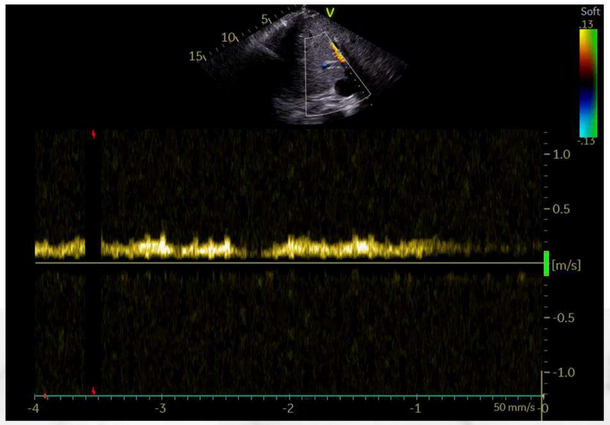
Amelia Campos-Sáenz de Santamaría[1,2], Zoila Stany Albines Fiestas[2,3], Silvia Crespo-Aznarez[1,2], Laura Karla Esterellas-Sánchez[1,2], Marta Sánchez-Marteles[1,2,4], Vanesa Garcés-Horna[1,2,4], Claudia Josa-Laorden[2,4], Alejandro Alcaine-Otín[5], Ignacio Gimenez-Lopez[2,4,6,*] and Jorge Rubio-Gracia[1,2,4]





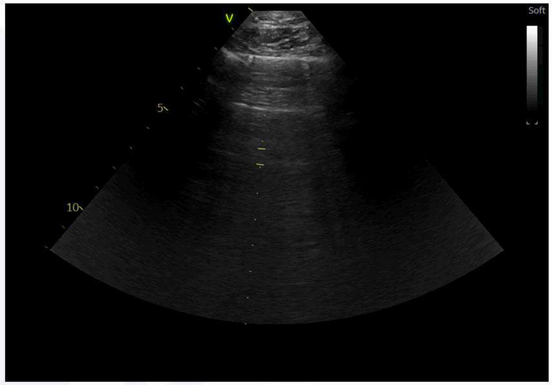
PCWP	RAP
III diastolic disfunction	VExUS 3
MR 3+	Creatinine 5.4
Mitral Gradient 3.2 mmHg	MELD Score 36
proBNP 31500	Bil ToT/AST

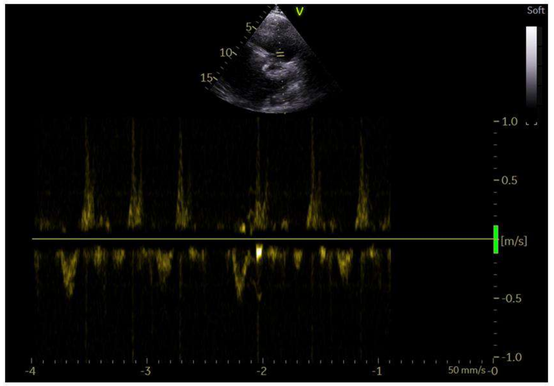




Acute Tubular Necrosis

CRRT





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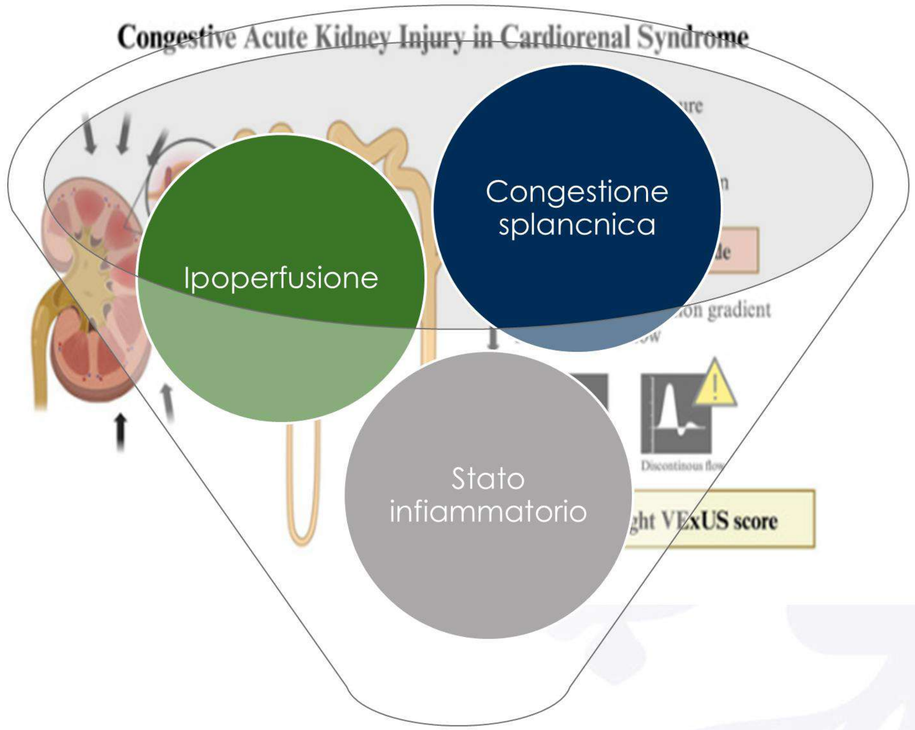
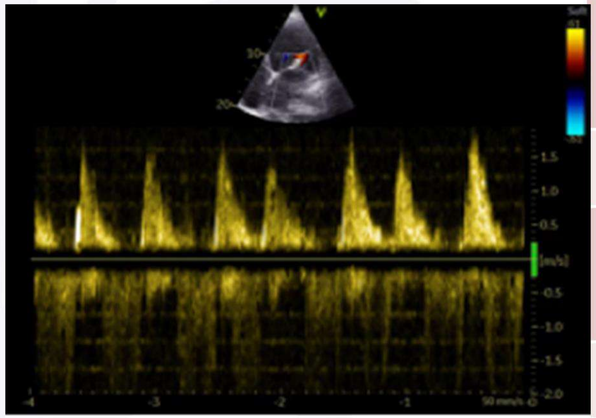
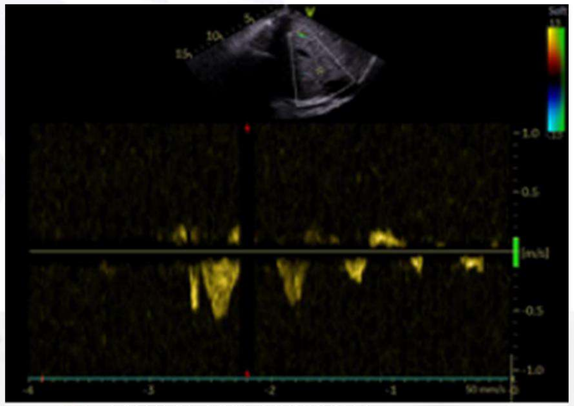
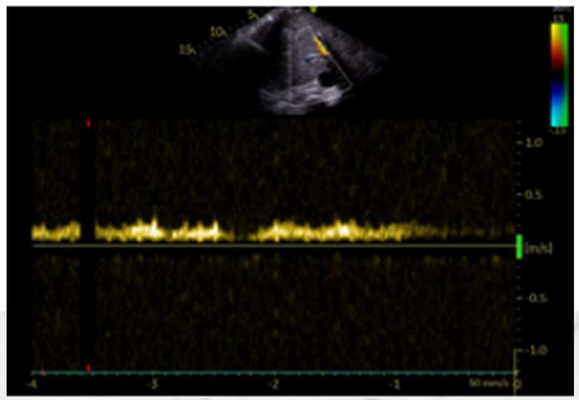




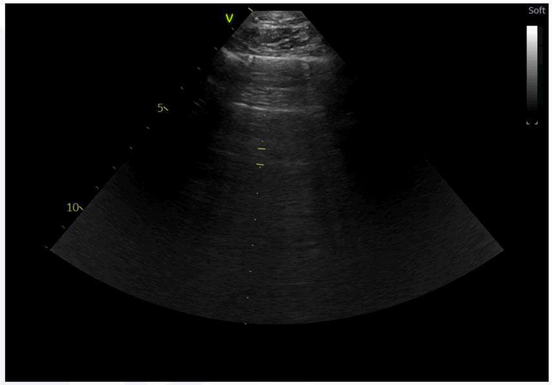
PCWP	RAP
III diastolic disfunction	VExUS 3
MR 3+	Creatinine 5.4
Mitral Gradient 3.2 mmHg	MELD Score 36
proBNP 31500	Bil ToT/AST

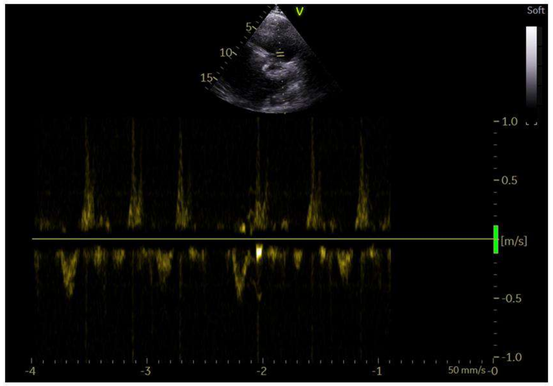




Acute Tubular Necrosis

CRRT


Soft
5
10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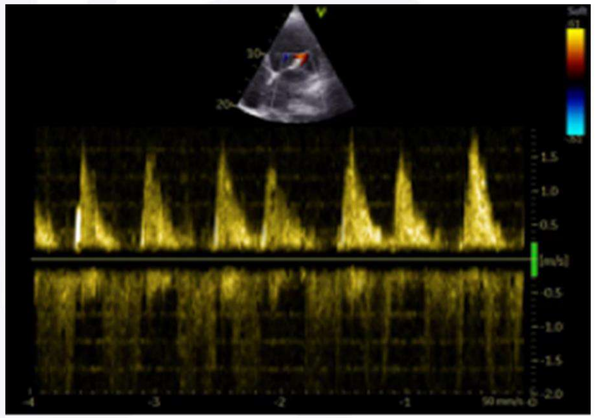
5
10
15
1.0
0.5
[m/s]
-0.5
-1.0
-4
-3
-2
-1
50 mm/s
-0


Soft
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20
1.5
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[m/s]
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-2.0
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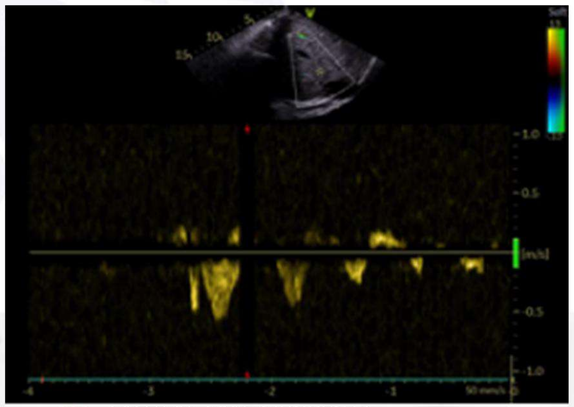
-2
-1
50 mm/s
-0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[m/s]
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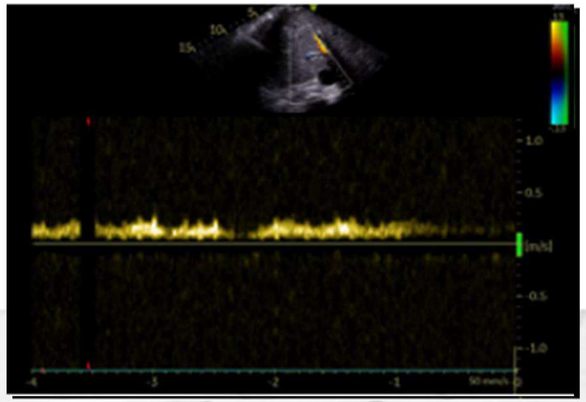
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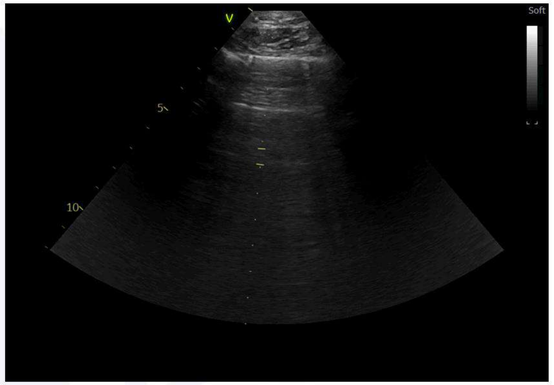
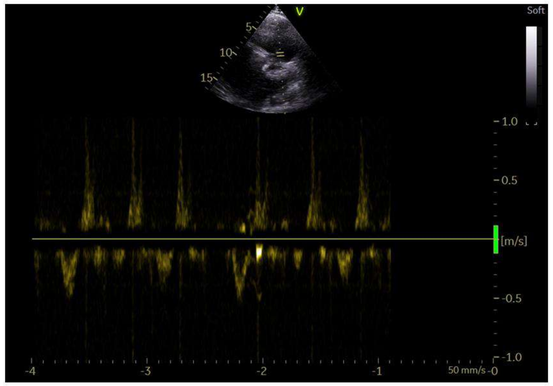
-0





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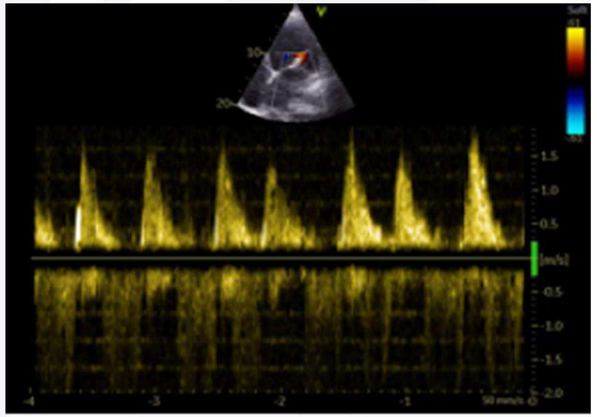

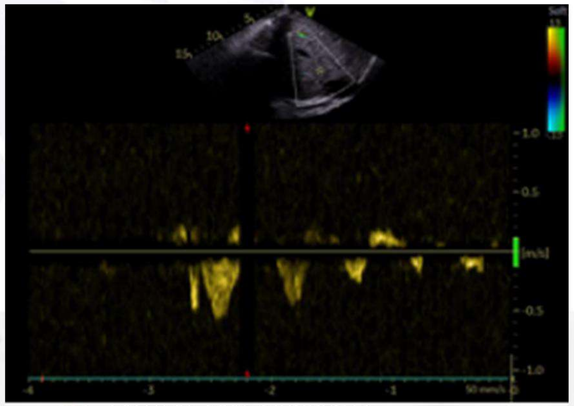

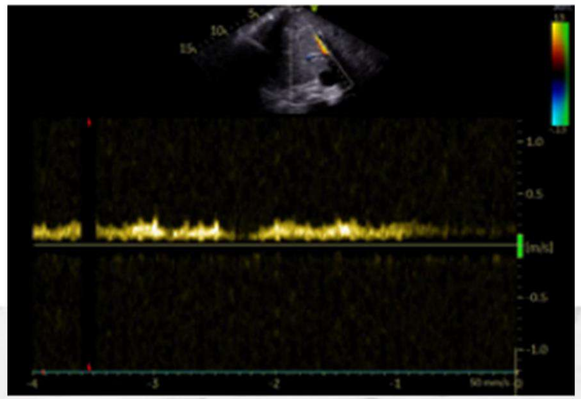

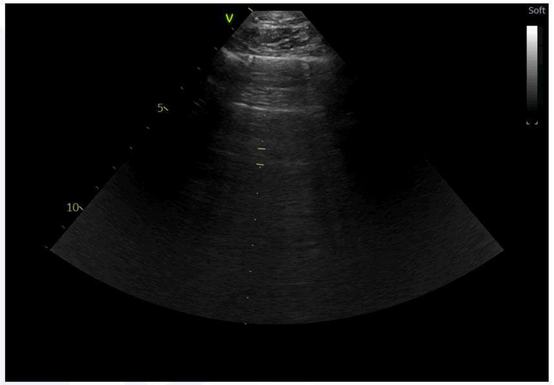

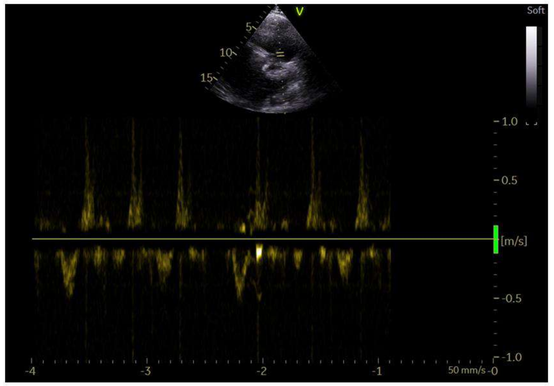

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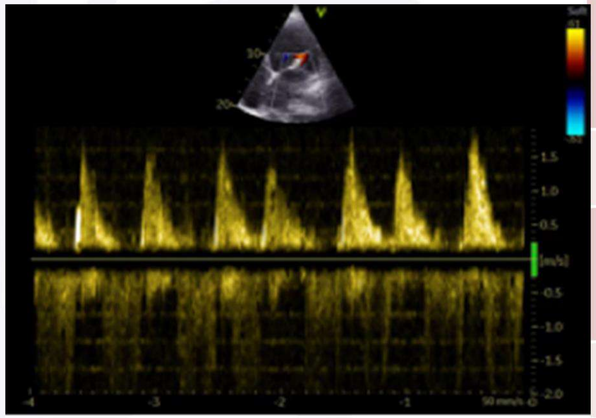

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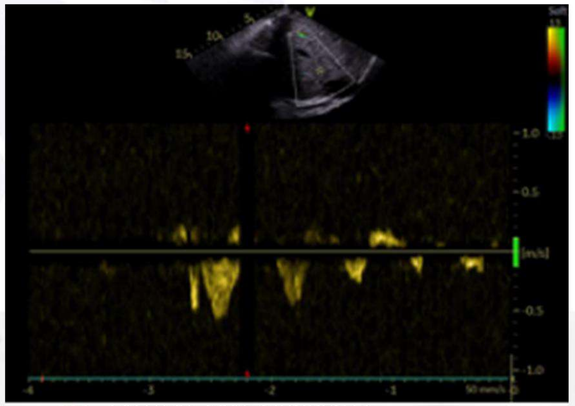

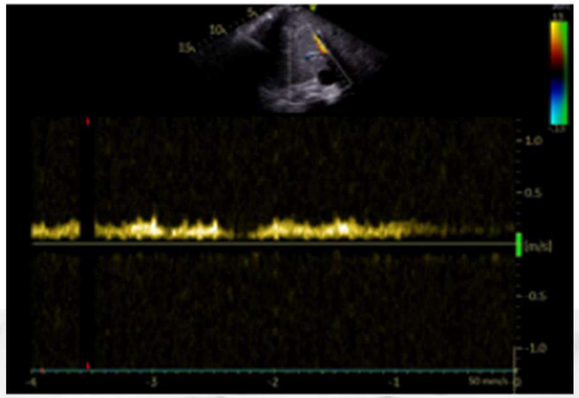

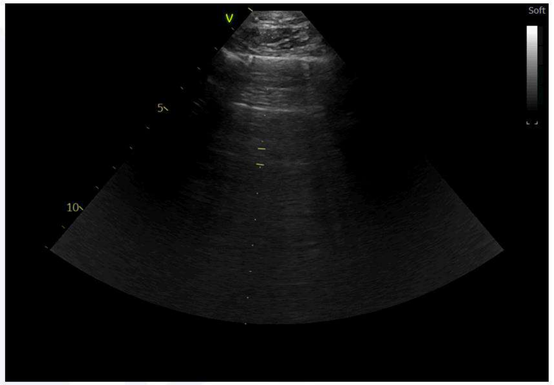

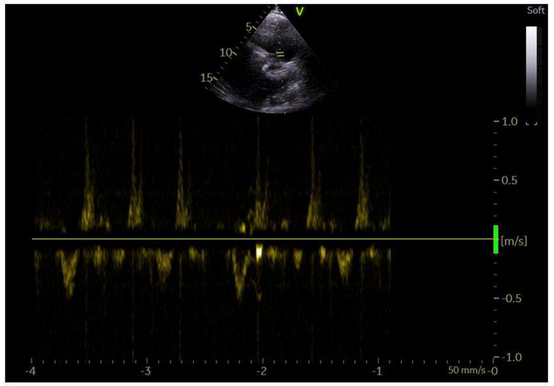

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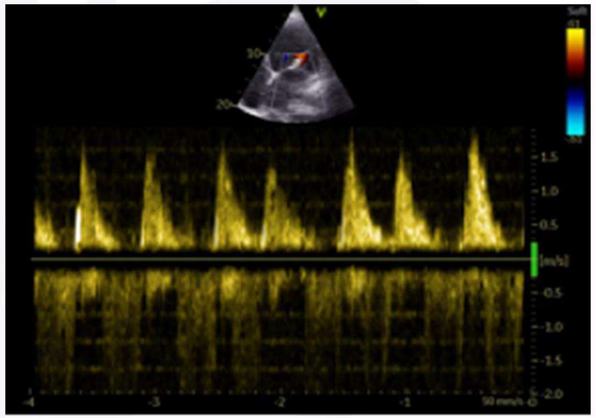
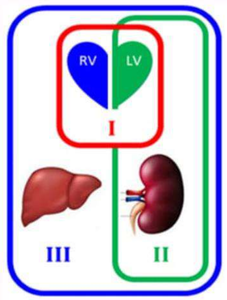
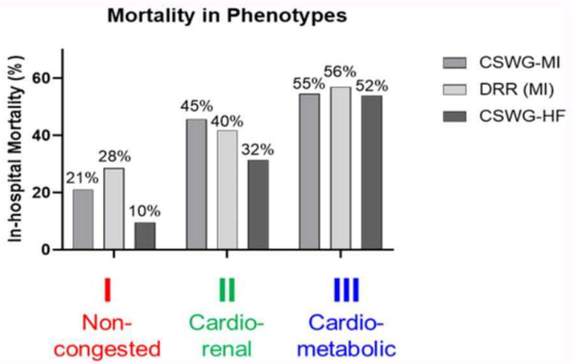
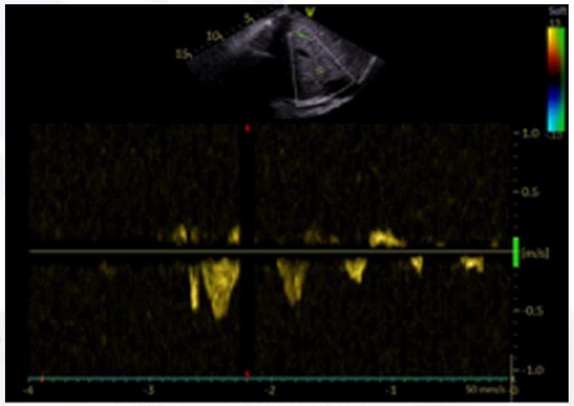
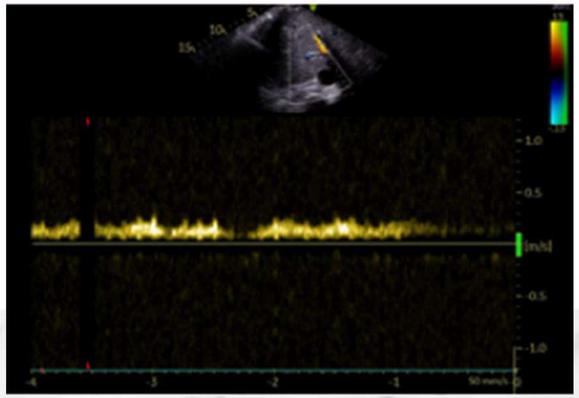
Predicted in-hospital mortality: 52-55%

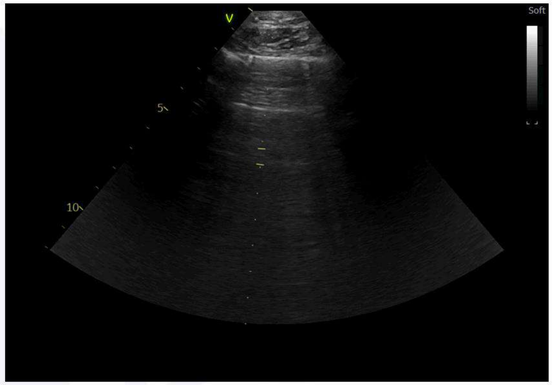


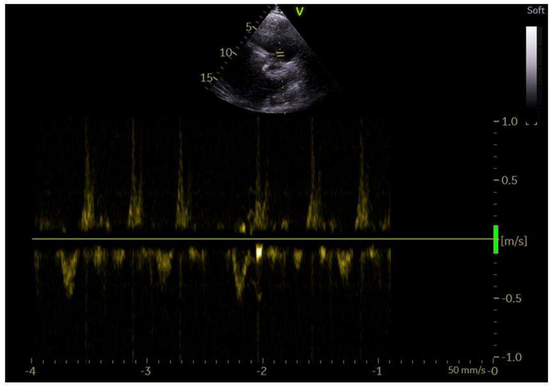












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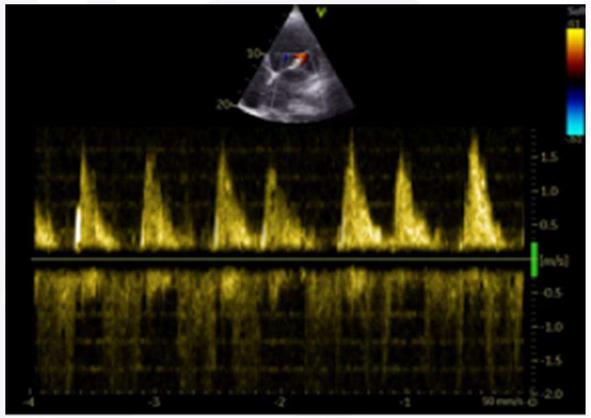

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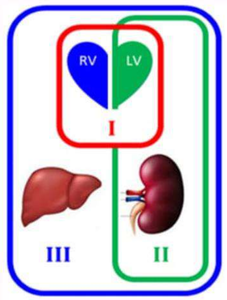

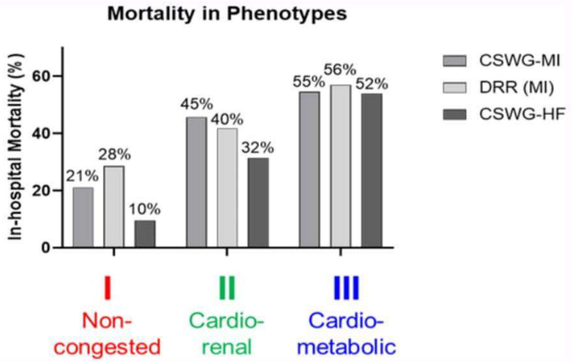

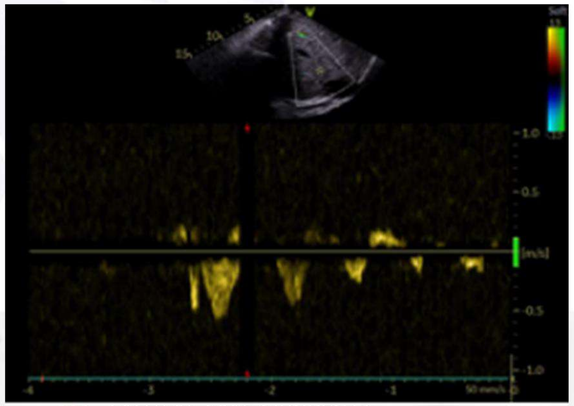

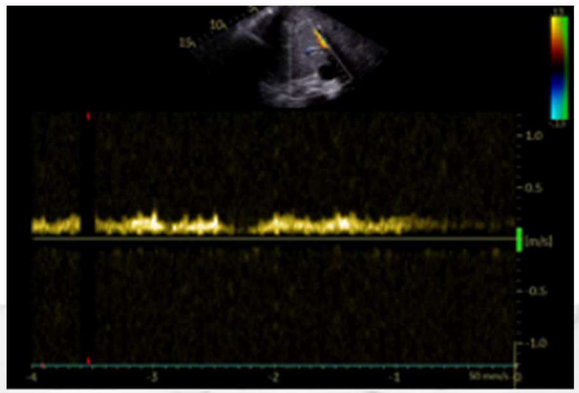

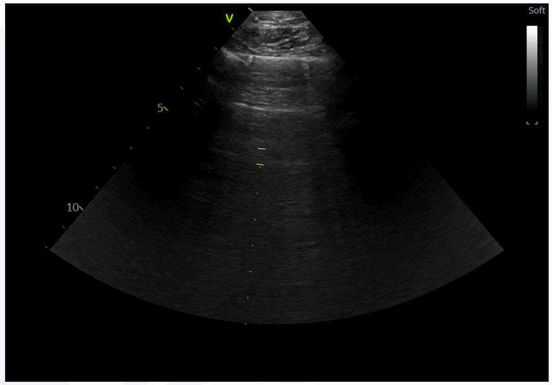

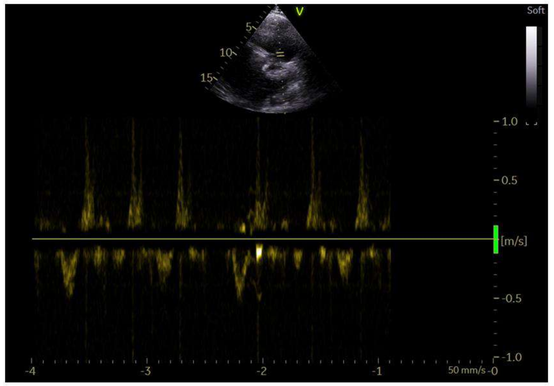

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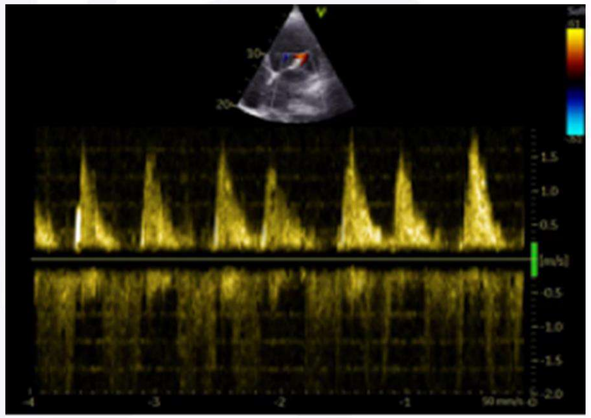

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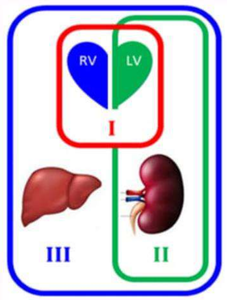
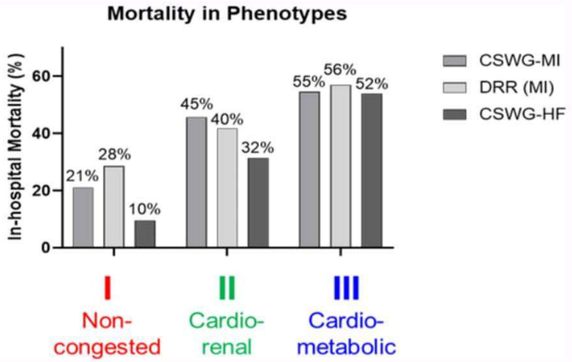
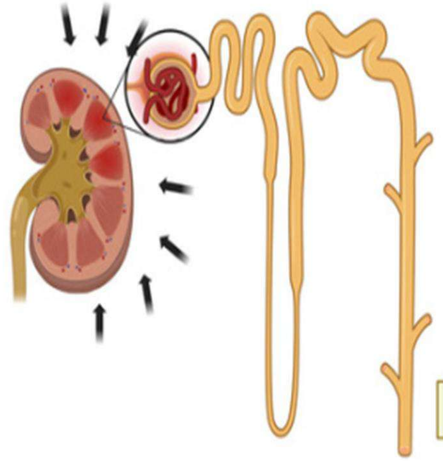




Congestive Acute Kidney Injury in Cardiorenal Syndrome

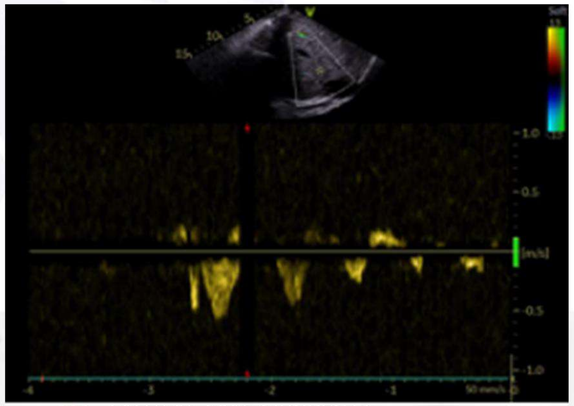


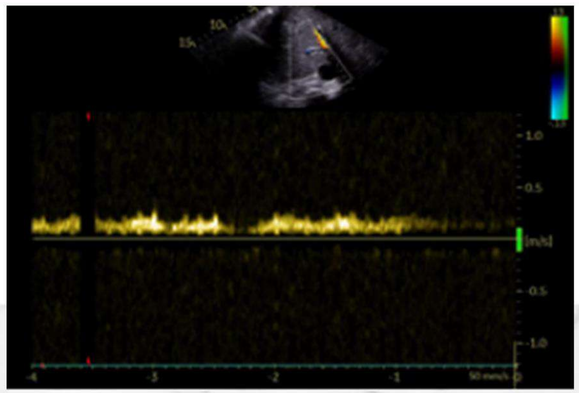
Intraabdominal pressure
Vasoconstriction
Intersticial edema
Sodium and water retention
Diuretic resistance

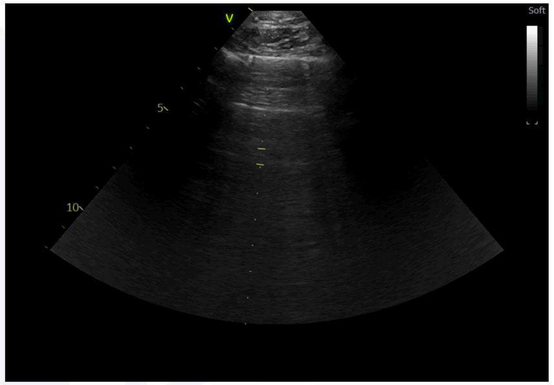
Intracapsular tamponade

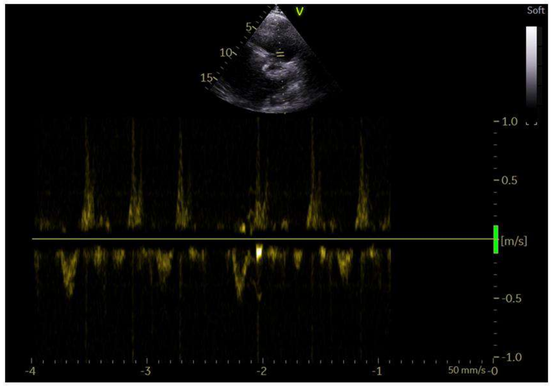
Decreased ultrafiltration gradient
Reduced renal flow

Detection throught VExUS score









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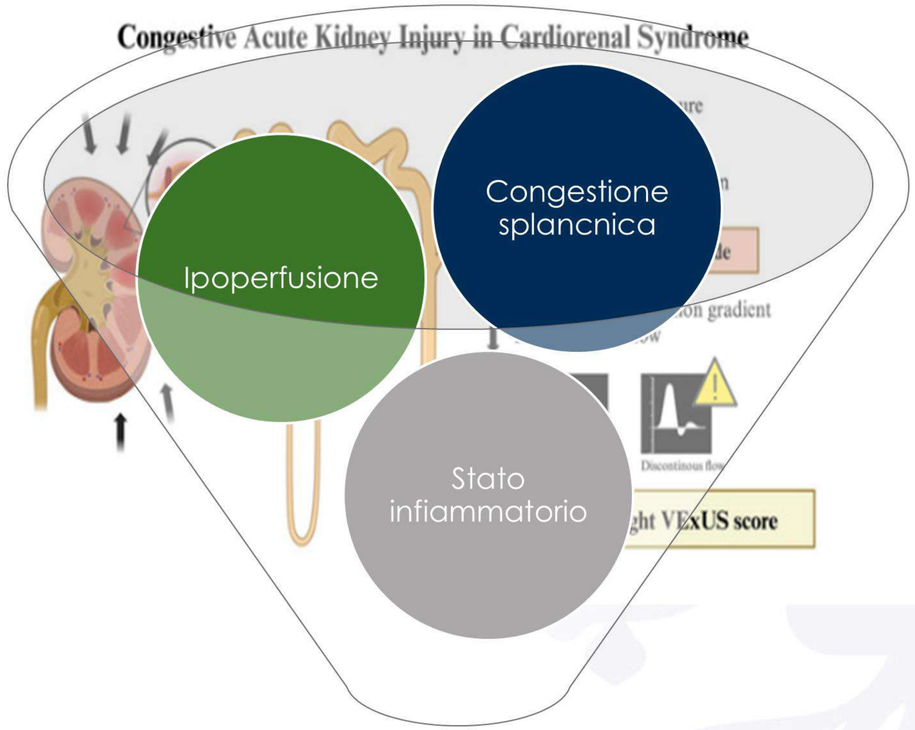
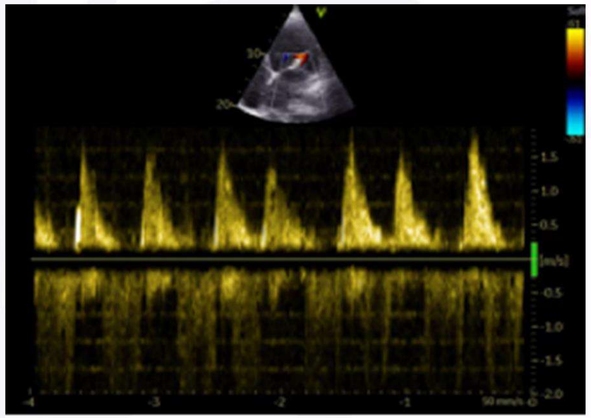


Acute Tubular Necrosis

CRRT



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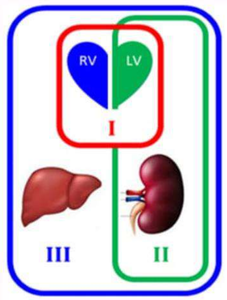
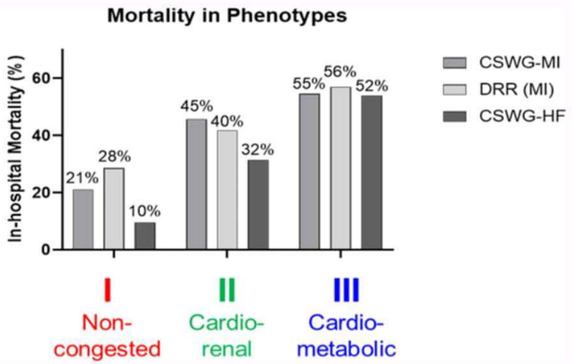
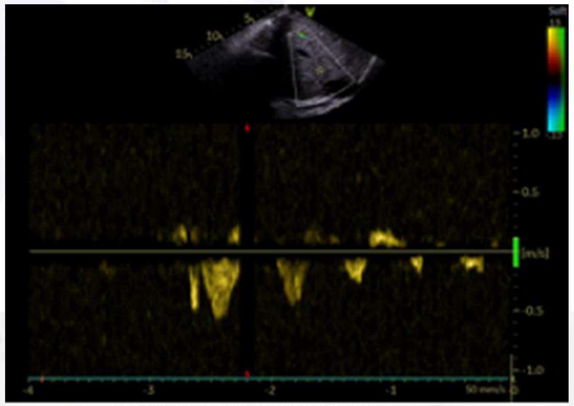
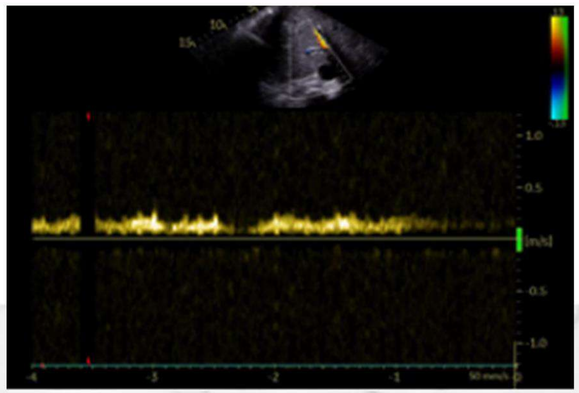
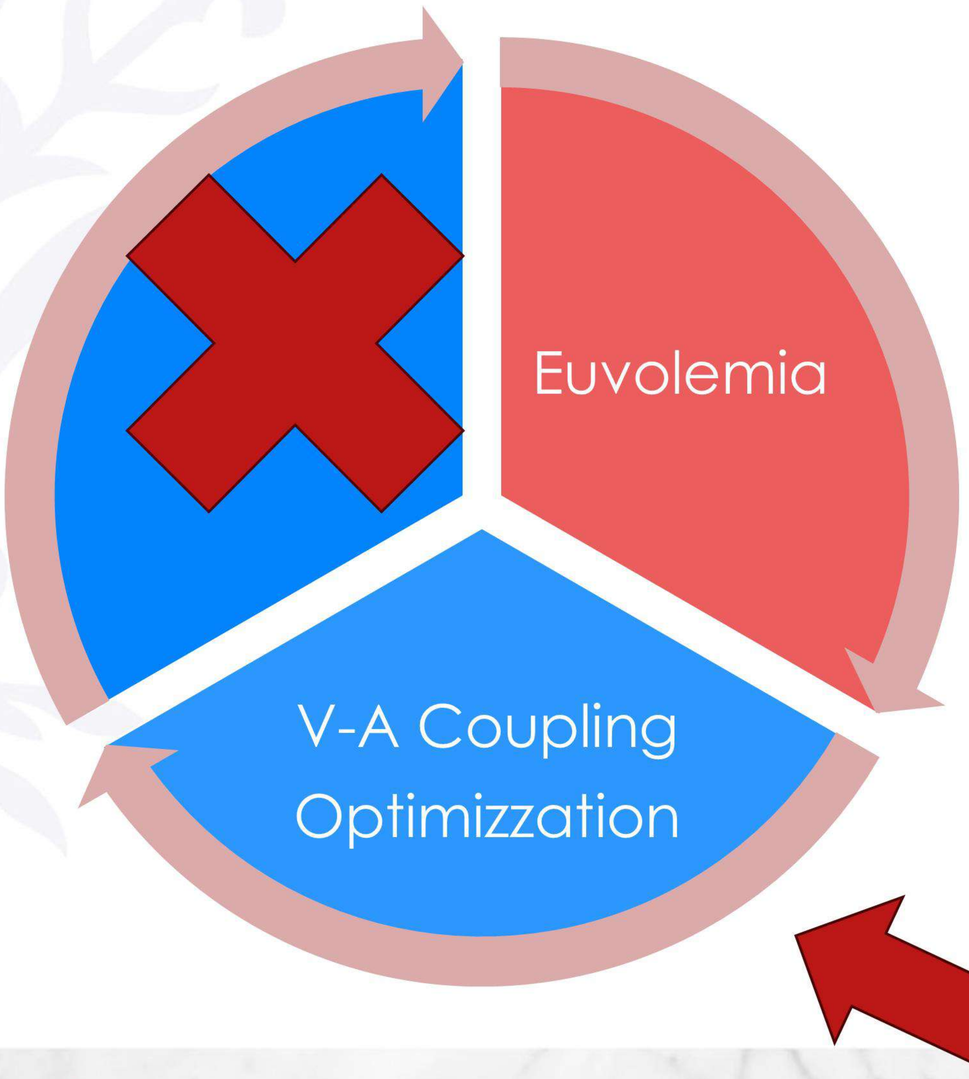


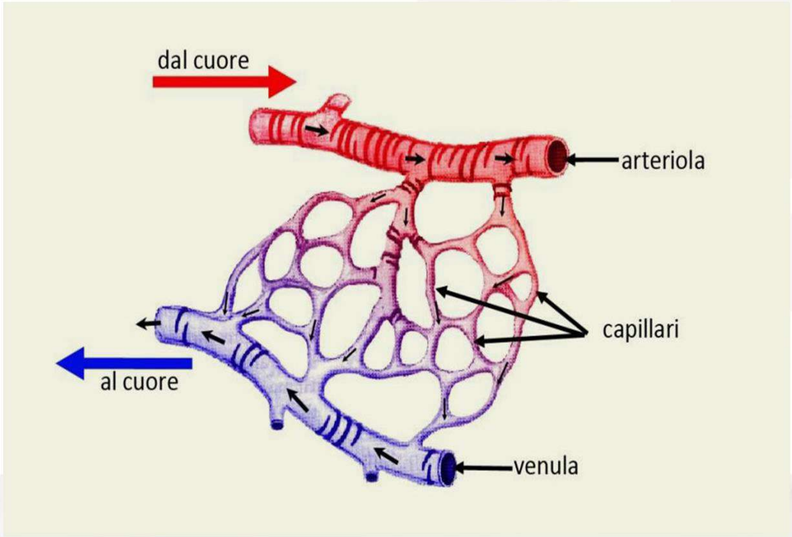







Euvolemia
V-A Coupling
Optimizzation

MCS

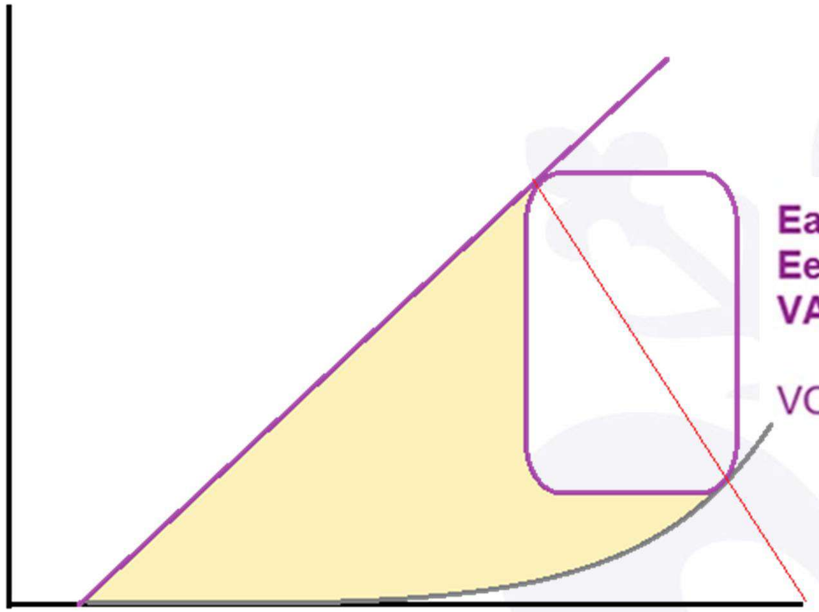

dal cuore
arteriola
capillari
al cuore
venula

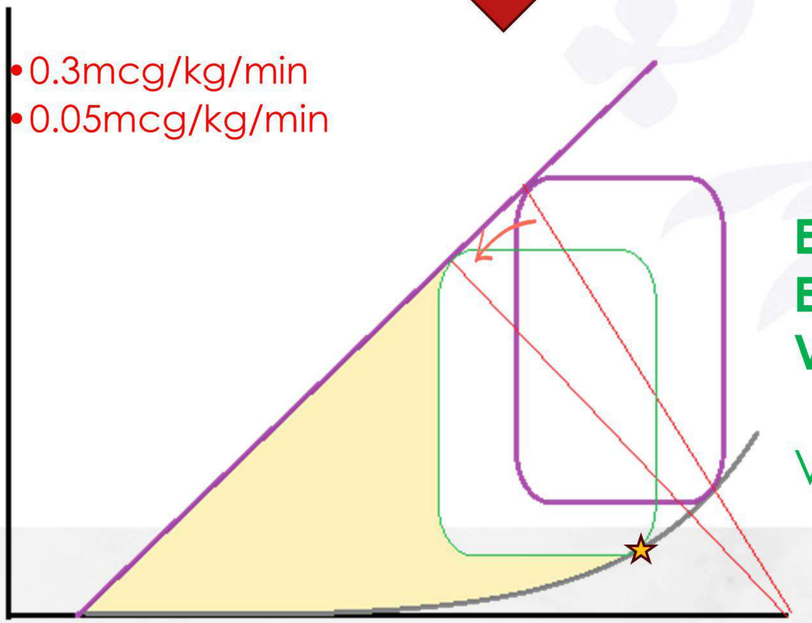
IABP

- 1:1

SNP + Levosimendan

- 0.3mcg/kg/min
- 0.05mcg/kg/min





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CRITICAL CARE COMMUNITY

Analizzatore
Modello: GEM® Premier 5000
Area: MON CSUN
Nome: MON CSUN
S/N: 21027290

Risultati

			Crit. Basso	Riferimento Basso	Riferimento Alto	Crit. Alto
Misurati (37.0°C)						
pH	↑ 7.56		--	7.35	7.45	--
pCO_2	↓ 28	mmHg	--	35	48	--
pO_2	↓ 65	mmHg	--	83	108	--
Na^+	↓ 128	mmol/L	--	135	145	--
K^+	↓ 3.3	mmol/L	--	3.5	5.0	--
Cl^-	97	mmol/L	--	95	105	--
Ca^{++}	↓ 1.05	mmol/L	--	1.15	1.27	--
Hct	↓ 30	%	--	36	53	--
Glu	↑ 133	mg/dL	--	60	110	--
Lac	↑ 2.0	mmol/L	--	0.0	1.3	--
CO-Ossimetro						
tHb	↓ 10.3	g/dL	--	12.0	17.0	--
O_2Hb	↓ 93.2	%	--	95.0	98.0	--
COHb	0.9	%	--	0.5	1.5	--
MetHb	1.1	%	--	0.0	1.5	--
HHb	4.8	%	--	0.0	5.0	--
sO_2	95.1	%	--	94.0	98.0	--
Derivati						
TCO_2	↑ 26.0	mmol/L	--	19.0	24.0	--
BEecf	2.9	mmol/L	--	--	--	--
tHb(c)	10.2	g/dL	--	--	--	--
BE(B)	3.8	mmol/L	--	--	--	--
$Ca^{++}(7.4)$	1.12	mmol/L	--	--	--	--
AG	9	mmol/L	--	--	--	--
P/F Ratio	163	mmHg	--	--	--	--
pAO_2	250	mmHg	--	--	--	--
CaO_2	13.5	mL/dL	--	--	--	--
O_2cap	14.0	mL/dL	--	--	--	--
O_2ct	13.5	mL/dL	--	--	--	--
$sO_2(c)$	95.1	%	--	--	--	--
$HCO_3^-(c)$	25.1	mmol/L	--	21.0	28.0	--
HCO_3^-std	27.8	mmol/L	--	--	--	--
$A\text{-}aDO_2$	185	mmHg	--	--	--	--
paO_2/pAO_2	0.26		--	--	--	--
RI	2.8		--	--	--	--
CcO_2	15.0	mL/dL	--	--	--	--
Qsp/Qt(est)	30.0	%	--	--	--	--
Hct(c)	31	%	--	--	--	--
mOsm	263.4	mmol/L	--	--	--	--
OI	incalc	%	--	--	--	--

↑↓ Fuori limite di riferimento

Scadenza:

Analizzatore
Modello: GEM® Premier 5000
Area: MON CSUN
Nome: MON CSUN
S/N: 21027290

Risultati

			Crit. Basso	Riferimento Basso	Riferimento Alto	Crit. Alto
Misurati (37.0°C)						
pH	7.47		--	--	--	--
pCO_2	36	mmHg	--	--	--	--
pO_2	36	mmHg	--	--	--	--
Na^+	129	mmol/L	--	--	--	--
K^+	3.3	mmol/L	--	--	--	--
Cl^-	97	mmol/L	--	--	--	--
Ca^{++}	1.07	mmol/L	--	--	--	--
Hct	30	%	--	--	--	--
Glu	124	mg/dL	--	--	--	--
Lac	2.1	mmol/L	--	--	--	--
CO-Ossimetro						
tHb	10.2	g/dL	--	--	--	--
O_2Hb	53.4	%	--	--	--	--
COHb	1.1	%	--	--	--	--
MetHb	0.2	%	--	--	--	--
HHb	45.2	%	--	--	--	--
sO_2	54.2	%	--	--	--	--
Derivati						
TCO_2	27.3	mmol/L	--	--	--	--
BEecf	2.5	mmol/L	--	--	--	--
tHb(c)	10.2	g/dL	--	--	--	--
BE(B)	2.7	mmol/L	--	--	--	--
$Ca^{++}(7.4)$	1.10	mmol/L	--	--	--	--
AG	9	mmol/L	--	--	--	--
O_2ct	7.7	mL/dL	--	--	--	--
$sO_2(c)$	73.5	%	--	--	--	--
$HCO_3^-(c)$	26.2	mmol/L	--	--	--	--
HCO_3^-std	26.2	mmol/L	--	--	--	--
Hct(c)	31	%	--	--	--	--
mOsm	264.9	mmol/L	--	--	--	--

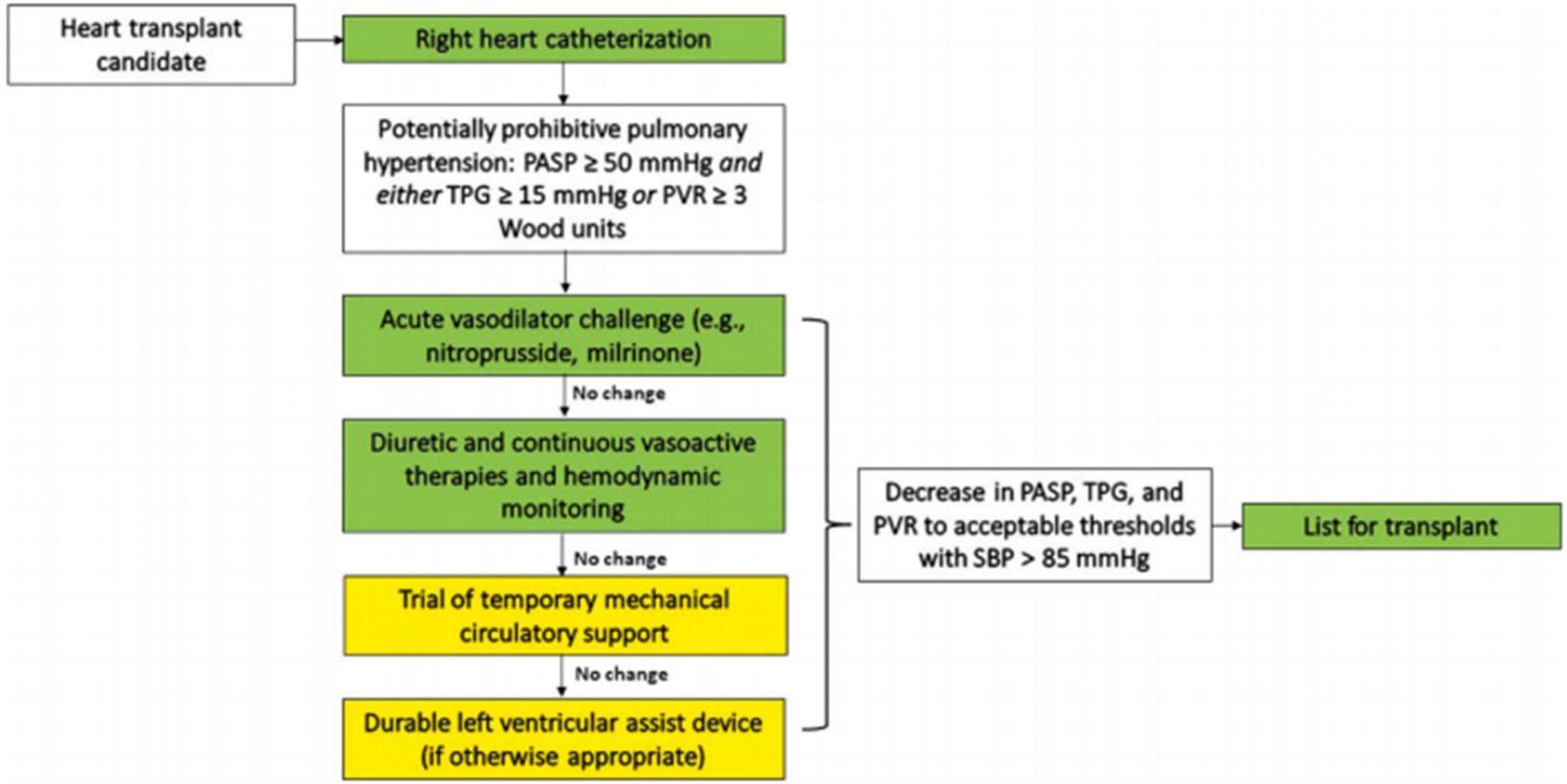
Altre informazioni

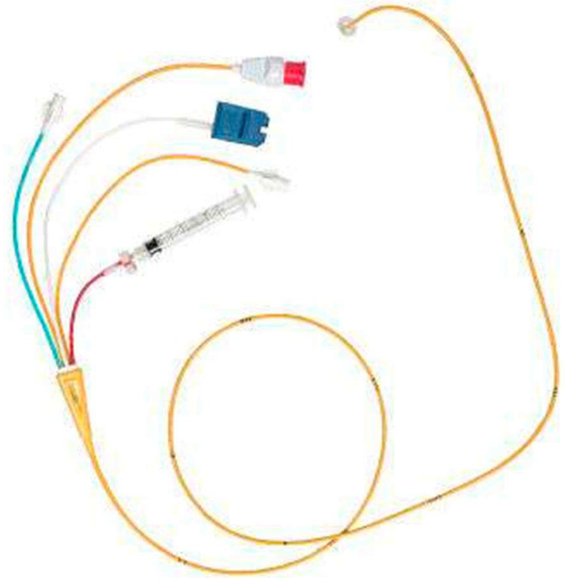
Inseriti		
Temp	37.0	°C
O2 / Vent		
FIO_2	40.0	%

iElastance

VAC	Es	Ees
3.4	2.5 mmHg/ml	1 mmHg/ml

SYSTOLIC PRESSURE	DIASTOLIC PRESSURE
90	60
EJECTION FRACTION	**STROKE VOLUME**
15	23
PRE-EJECTION TIME	**TOTAL EJECTION TIME**
88	177





Indice Cardiaco		1,98
Stroke Volume		58,14
Resistenze Sistemiche		
Resistenze Polmonari Totali		15,48
		1238
Resistenze Polmonari Vascolari		2,95
		236

MAP/FC	58/135 (AF)
CVP/PCWP	20/51 = 0,39
PVR	2,95
PAPi	1,3
CPO	0,52
TPG	12
DPG	?????

Parametri indiretti		
Indice cardiaco (CI)	CI = CO/BSA	2.5-4.0 l/min/m²
Gittata sistolica (SV)	SV = CO/HR*1000	60-100 ml
Gittata sistolica indicizzata (SVi)	SV = CI/HR*1000	33-47 ml/m²
Cardiac power output (CPO)	CPO = (CO x MAP)/451	≥1.0 W (soggetti sani)[18] >0.53 W (IMA-CS)[19] ≥0.60 W (IMA-CS)[20]
Cardiac power index (CPI)	CPO = (CI x MAP)/451	>0.32 W/m² (IMA-CS)[21]
RAP-correct		
RAP-correct		
Left ventricu		
Left ventricu		
Right ventri		
Right ventri		
Resistenze v		
Resistenze v		
Resistenze v		
Gradiente tr		
Gradiente d		
Arterial puls		
RAP/PAWP		≤0.63 (impianto LVAD)[26]
Pulmonary pulsatility index (PAPi)	PAPi = (PAPs–PAPd)/RAP	≥0.9 (IMA-CS)[27] ≥1.85-2.00 (impianto LVAD)[28,29] ≥3.65 (ICC avanzata)[30]
Pulmonary artery elastance (PaE)	PaE = PAPs/SV	≤0.85 mmHg/ml (ICC-CS)[31]
Pulmonary artery compliance (PaC)	PaC = SV/(PAPs–PAPd)	Non definito
P(v-a)CO_2.gap	P(a-v)CO_2-gap = PvCO_2–PaCO_2	≤6 mmHg[10]

Table 3 Relationship between commonly used haemodynamic parameters and various issues in post-capillary pulmonary hypertension

Observed parameter	Epidemiological value	Prognostic value	Determining pathophysiological mechanisms contributing to PH	Independence from other parameters	Transplant recipient selection
Increased PAP					
Increased PVR					
Increased TPG					
Increased DPG					
Decreased capacitance					

DPG, diastolic pressure gradient; PAP, pulmonary artery pressure; PH, pulmonary hypertension; PVR, pulmonary vascular resistance; TPG, transpulmonary gradient.

well demonstrated/useful; equivocally demonstrated/uncertain; not demonstrated/useless.

1) **PVR** may be overestimated in low CO as a consequence of under-recruited pulmonary vasculature, which is a transient phenomenon related to the low output state leading to overestimation.

capillary PH. However, this parameter is also strongly influenced by the CO, and loading conditions, suggesting that it may depend not only on pul-monary vessels but also on cardiac pump function.

ESC Heart Failure 2018; 5: 755–763 DOI: 10.1002/ehf2.12316

Critical Cardiol 2024;25(9):624-639

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PH-HF (PAPm >25)

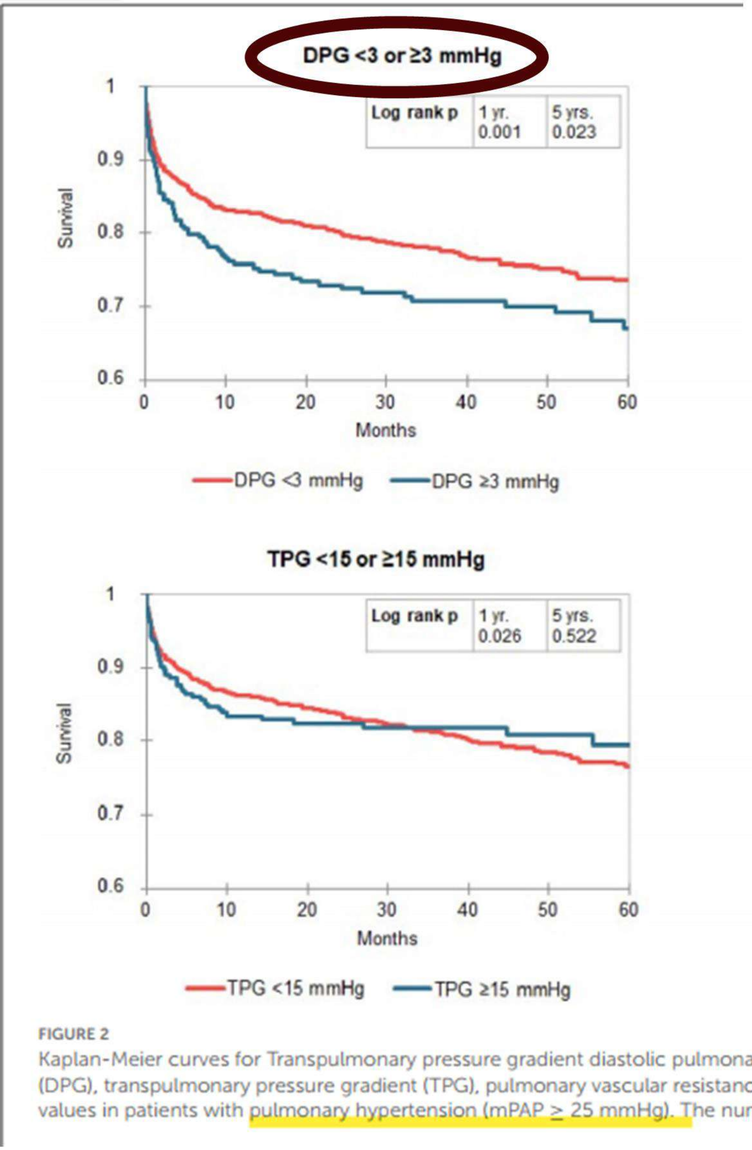
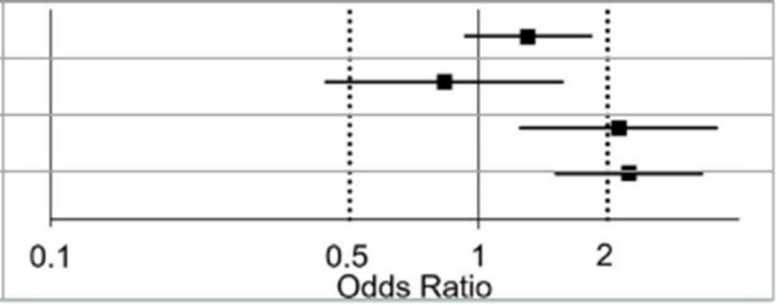
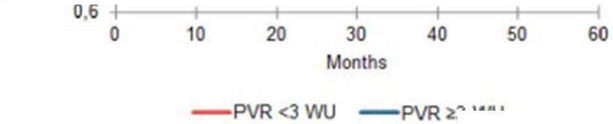


FIGURE 2
Kaplan-Meier curves for Transpulmonary pressure gradient diastolic pulmonary artery pressure-to-pulmonary capillary wedge (DPG), transpulmonary pressure gradient (TPG), pulmonary vascular resistance (PVR) and pulmonary pulsatility index (PAPi) dive values in patients with pulmonary hypertension (mPAP ≥ 25 mmHg). The numbers of patients at risk are listed in Supplementar

Factor	OR	95% CI	*p*	OR and 95% CI
DPG > 3 mmHg	1.30	(0.93–1.83)	0.125	
TPG > 15 mmHg	0.83	(0.44–1.57)	0.571	
PVR > 3 WU	2.12	(1.25–3.59)	0.005	
PAPi < 2.37	2.24	(1.51–3.32)	<0.001	



DPG, diastolic pulmonary artery pressure-to-pulmonary capillary wedge pressure gradient; TPG, transpulmonary gradient; PVR, pulmonary vascular resistance; PAPi, pulmonary artery pulsatility index.



	1-year survival	Graft failure
TPG > 15 mmHg	→	→
PVR > 3 WU	→	↑
DPG > 3 mmHg	↑	→
PAPi < 2.37	→	↑

FIGURE 4
Hemodynamics risk factors of OHT in patients with PH.

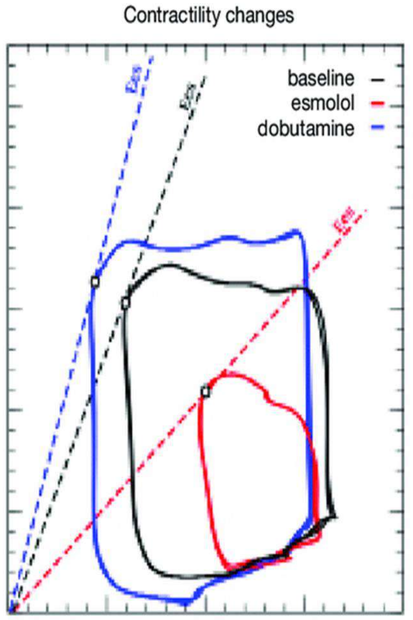
Front. Cardiovasc. Med. 9:1036547. doi: 10.3389/fcvm.2022.1036547 EUROTRASPLANT DATABASE

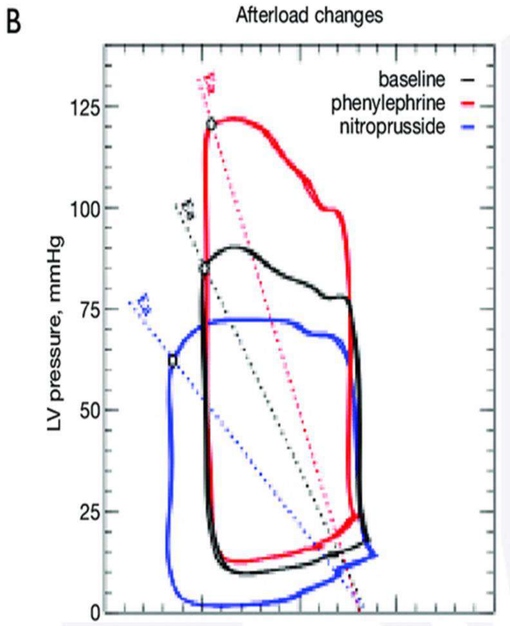
Unloading del ventricolo sinistro

Obiettivi del test di vasoreattività

VA Coupling

Incrementare il CO





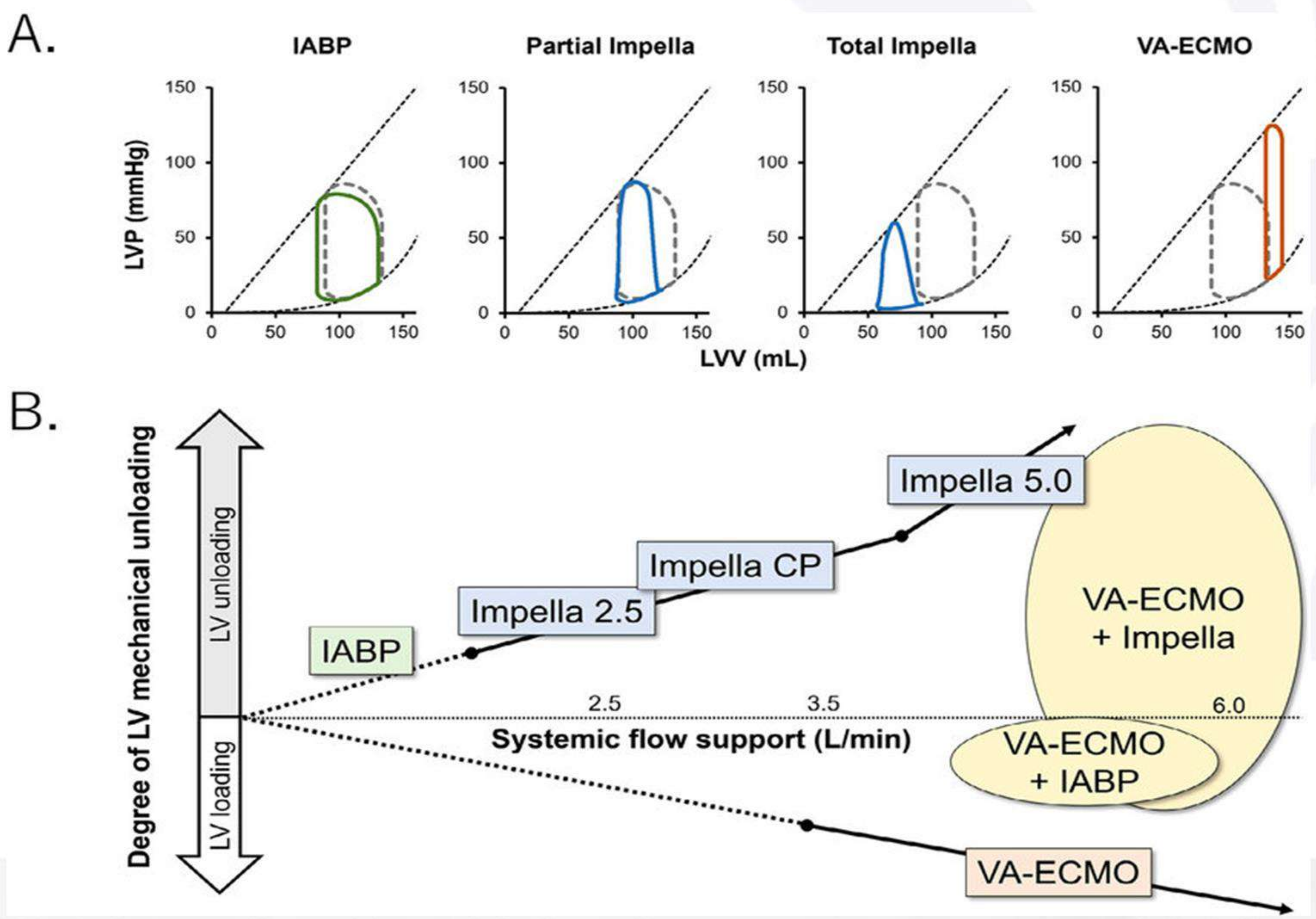
Understanding ventriculo-arterial coupling, 10.21037/atm.2020.04.10- Clinical and Translational Medicine

Unloading del ventricolo sinistro

Obiettivi del test di vasoreattività

VA Coupling

Incrementare il CO



Izu, Keita & Yokota, Shohei & Nishikawa, Takuya & Kinugawa, Koichiro. (2021). Interventional heart failure therapy: A new concept fighting

Understanding ventriculo-arterial coupling, 10.21037/atm.2020.04.10- Clinical and Translational Medicine

Test di vasoreattività

Vasodilatatori polmonari (NO, PGE)	Inodilatatori (Milrinone, Levosimendan, Dobutamina)	Vasodilatatori sistemici (NTG, Nitroprussiato)
Incremento CI		
↑ (se disaccoppiamento V-A destro)	↑↑↑	↑ (se disaccoppiamento V-A sistemico)
Riduzione della PCWP		
↓ (in alcune casistiche NO aumentava PCWP)	↑↑	↑↑↑
Riduzione delle PVR		
↑↑↑	↑	↑↑
Riduzione della PAPm		
↑↑↑	↑	↑↑

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Guglin et al.: Drug comparison for PH reversibility testing

IABP

- 1:1

SNP + Levosimendan

- 0.3mcg/kg/min
- 0.05mcg/kg/min

SNP + Enoximone

- 0.3mcg/kg/min
- 5mcg/kg/min

08.11

- Lab Value improved
- PVR Improved ➔ Heart Team

- Having recovered renal function
- The patients echocardiographic picture at that point included severe biventricular systo-diastolic dysfunction

(LVEF 15%, RV FAC 15%, grade III diastolic dysfunction, moderate degree residual mitral insufficiency),

with a severe splanchnic congestion state.

Università degli Studi della Campania Luigi Vanvitelli

UNIVERSITA' DELLA CAMPANIA LUIGI VANVITELLI
DIPARTIMENTO DI SCIENZE MEDICHE TRASLAZIONALI
CATTEDRA DI CHIRURGIA CARDIACA
SCUOLA DI SPECIALIZZAZIONE IN CARDIOCHIRURGIA
Direttore: Prof.ssa Marisa De Feo

OSPEDALI DEI COLLI
MONALDI - COTUGNO - C.T.O.
"AZIENDA OSPEDALIERA SPECIALISTICA DEI COLLI"
Monaldi - Cotugno - C.T.O.

AZIENDA OSPEDALIERA DEI COLLI
OSPEDALE MONALDI
DIPARTIMENTO DI CARDIOCHIRURGIA E DEI TRAPIANTI
Direttore: Prof.ssaMarisa De Feo

Intestazione prima pagina

Verbale riunione team multidisciplinare per valutazione pazienti da inserire in lista di attesa per trapianto di cuore.

Il giorno 08 novembre 2024 alle ore 9.00, presso la Terapia Intensiva di Cardiochirurgia, si è riunito il team multidisciplinare per discutere dell'argomento di cui in oggetto.

paziente. Concorda che se le resistenze risultino ancora alterate si possa ridiscutere e pensare ad un impianto LVAD che comporta un rischio più alto per la presenza della mitraclip che dovrebbe esser rimossa. Il dott. [redacted] e il resto dei presenti concordano per portare il paziente alle condizioni di essere inserito in urgenza in lista trapianto.

Decisione finale: Indicazione ad effettuare tac total body, nuovo cateterismo e monitorare le resistenze per poi iscriverlo in lista urgente per il trapianto.

CAMERA	SATURAZIONE	PRESSIONI (mmHg)		
	O_2 %	Onda A	Onda V	Media
Atrio DX				
	O_2 %	Sistolica	Diastolica	Telediastolica
Ventricolo DX		58	10	22
	O_2 %	Max	Min	Media
Arteria Polmonare		60	30	44
	O_2 %	Onda A	Onda V	Media
Capillare Polmonare		38	31	34
	O_2 %	Onda A	Onda V	Media
Atrio SIN				
	O_2 %	Sistolica	Diastolica	Telediastolica
Ventricolo SIN				
	O_2 %	Max	Min	Media
Aorta				

PORTATA CARDIACA	FICK	TERMODILUITORE	
Consumo O_2			ml O_2/min
Portata Cardiaca		5,7	l/min
Indice Cardiaco		2,85	l/min/m^2 BSA (V.N. 2.8-4.2)

Resistenze Polmonari Totali		7,72
		618
Resistenze Polmonari Vascolari		1,75
		140

MAP/FC	52/127 (AF)
CVP/PCWP	20/34 = 0,58
PVR	1,75
PAPi	1,5
CPO	0,65
TPG	10

- Urgenza di livello 2 (Urgenza di macroarea) –

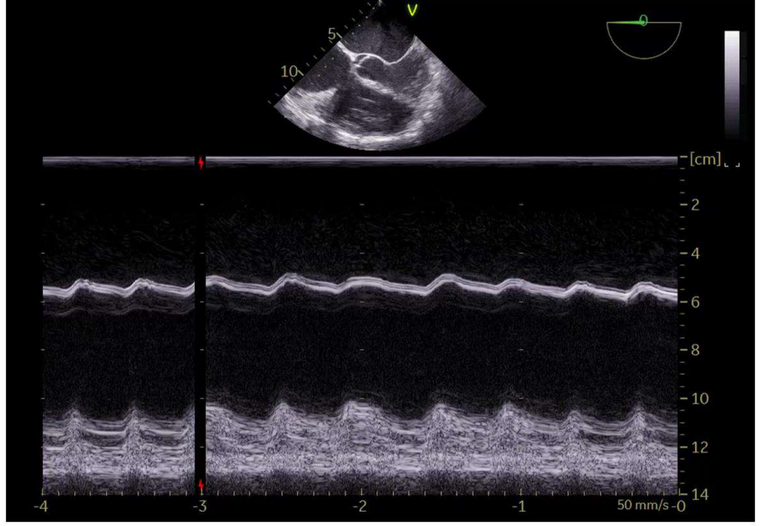
Accesso alle donazioni della macroarea del centro richiedente, non allocate a Urgenza 1

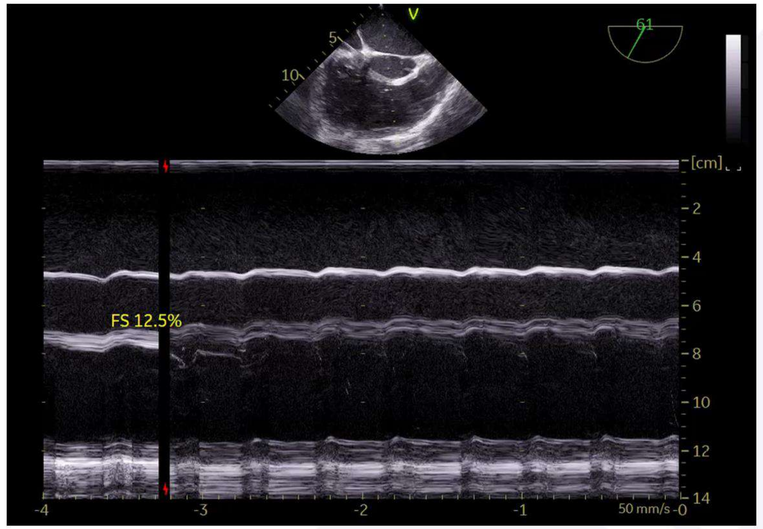
- lABP o assistenza percutanea trans-aortica a flusso continuo La necessità di impianto va documentata con breve relazione clinica che evidenzi la presenza di bassa portata cardiaca prima dell'impianto e la non indicazione ad impiantare LVAD di lungo periodo Lo status va confermato ogni 7 giorni documentando sia l'impossibilità di svezzare il paziente sia la persistenza di controindicazioni all'impianto di LVAD di lungo periodo

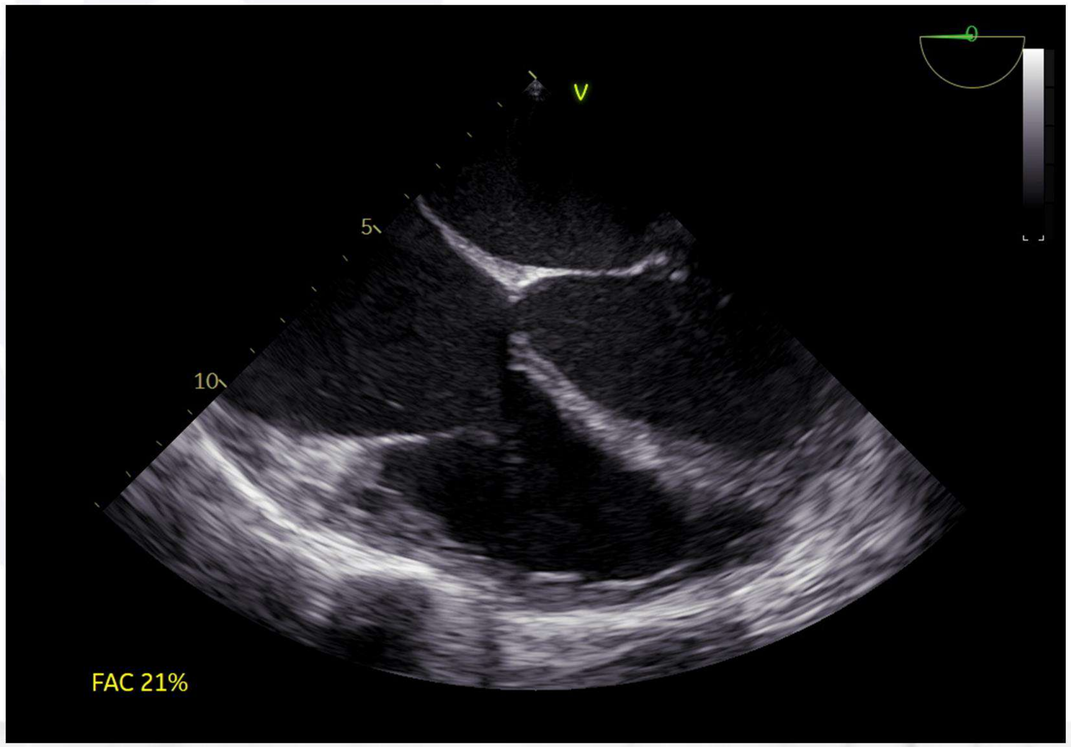
15.11

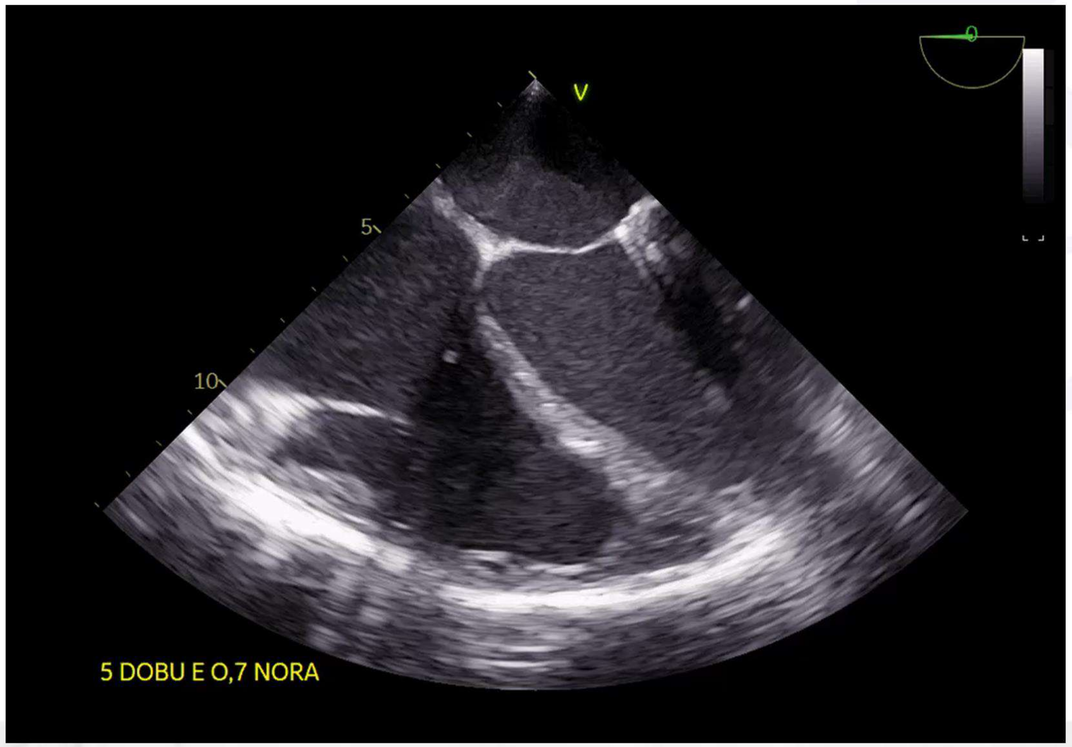
- Hemodinamically stable.
- IABP ineffective removal attempt

Worsening









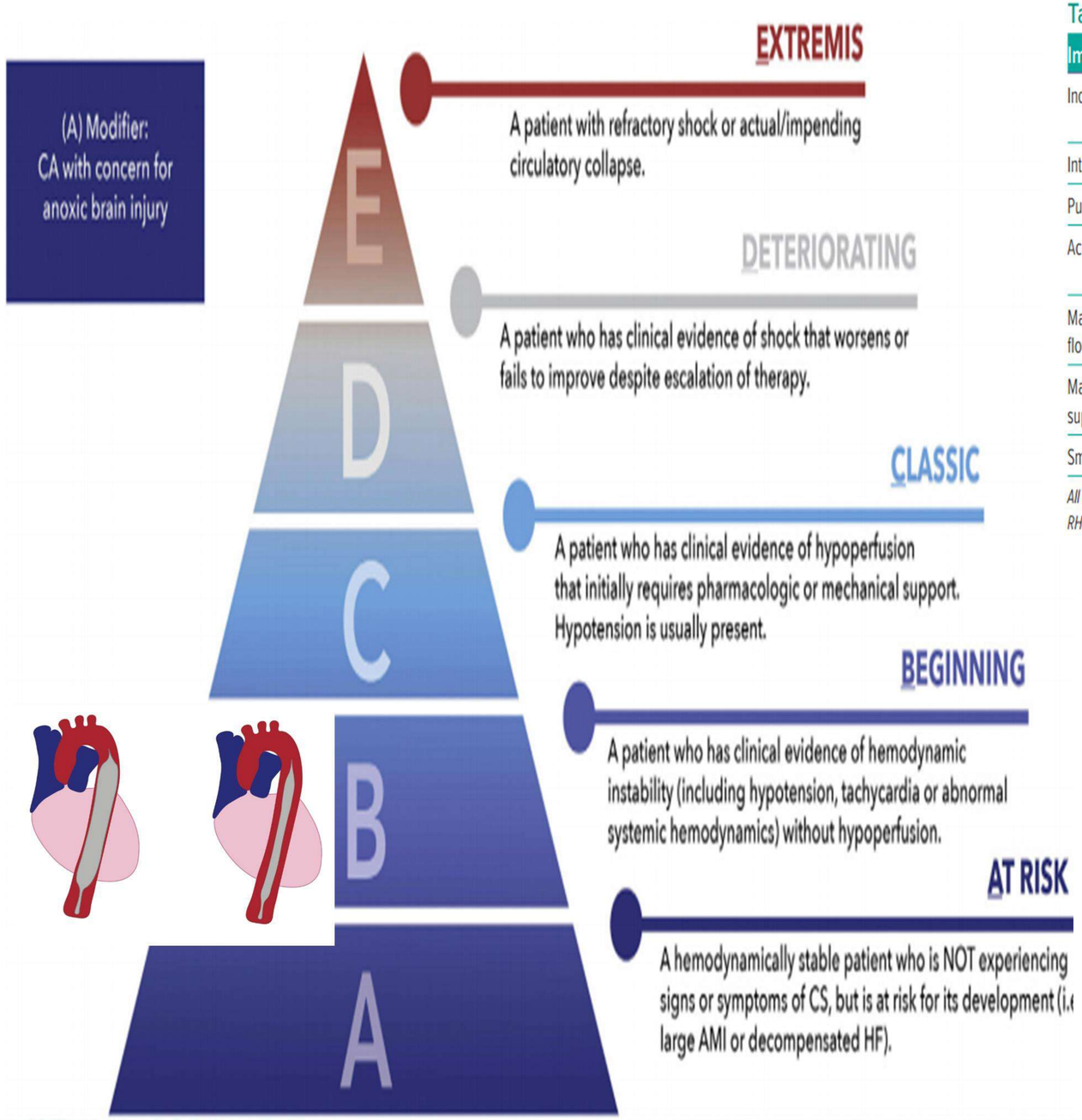


Table 1: Impella Device Technical Specifications

Impella Device	2.5	CP	5.0	LD	5.5	RP
Indication	HRPCI and CS	HRPCI and CS	CS	CS	CS	RHF or decompensation
Introducer diameter	13 Fr	14 Fr	23 Fr	--	23 Fr	23 Fr
Pump motor	12 Fr	14 Fr	21 Fr	21 Fr	19 Fr	22 Fr
Access	Percutaneous femoral or axillary	Percutaneous femoral or axillary	Femoral cutdown or axillary	Direct insertion into AA	Axillary cutdown or direct insertion into AA	Percutaneous femoral vein (to PA)
Maximum average flow (l/min)	2.5	3.7	5.0	5.3	5.5	4.4
Maximum duration of support	HRPCI: ≤6 hours CS: ≤4 days	HRPCI: ≤6 hours CS: ≤4 days	14 days	14 days	14 days	14 days
SmartAssist?	N	Y	N	N	Y	N

All catheter diameters are 9 Fr, with the exception of the Impella RP (11 Fr). AA = ascending aorta; CS = cardiogenic shock; HRPCI = high-risk percutaneous coronary intervention; PA = pulmonary artery; RHF = right heart failure.

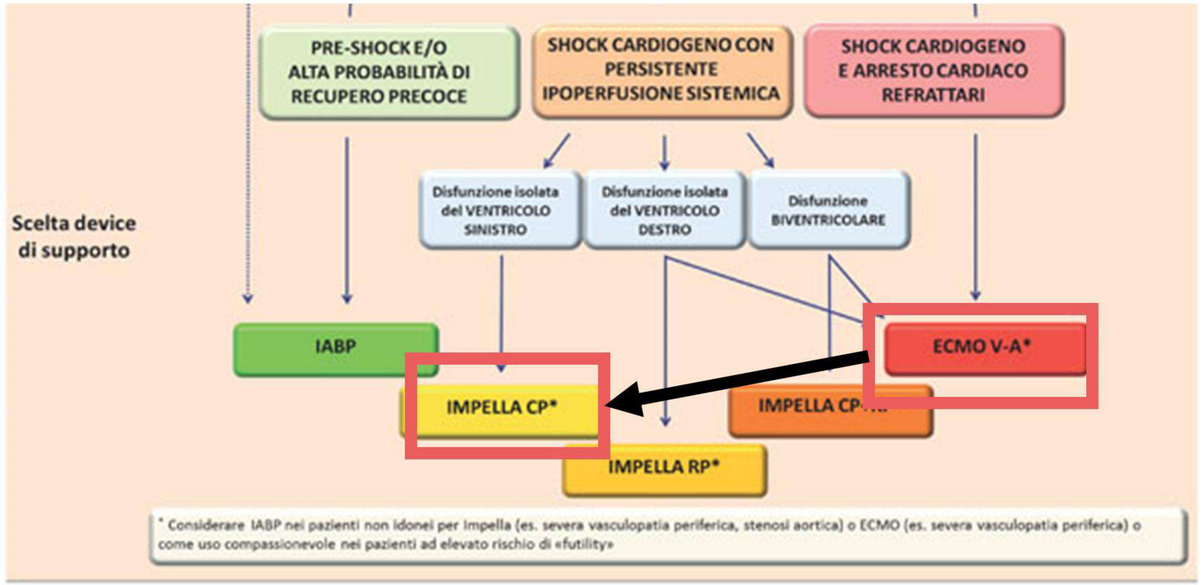


Figura 3. Possibili considerazioni per la scelta del tipo di assistenza meccanica percutanea nello shock cardiogeno.
ECMO V-A, sistema di ossigenazione a membrana extracorporea veno-arterioso; IABP, contropulsatore aortico; IMA, infarto miocardico acuto; TC, tomografia computerizzata.

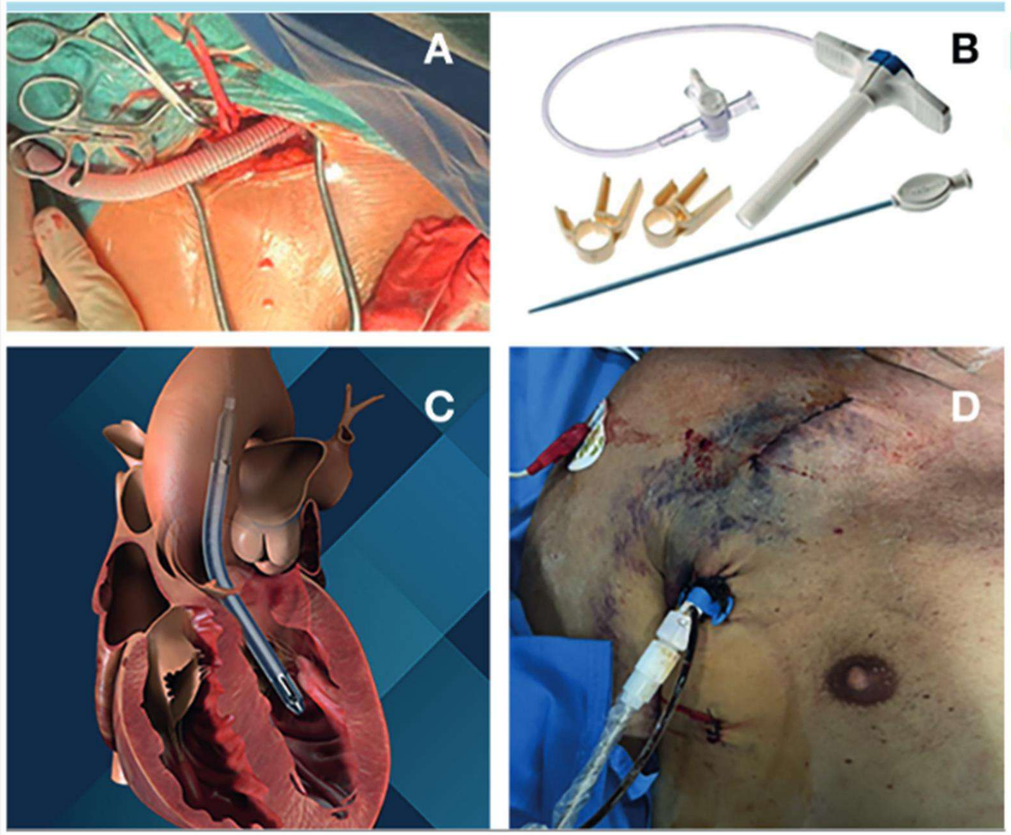
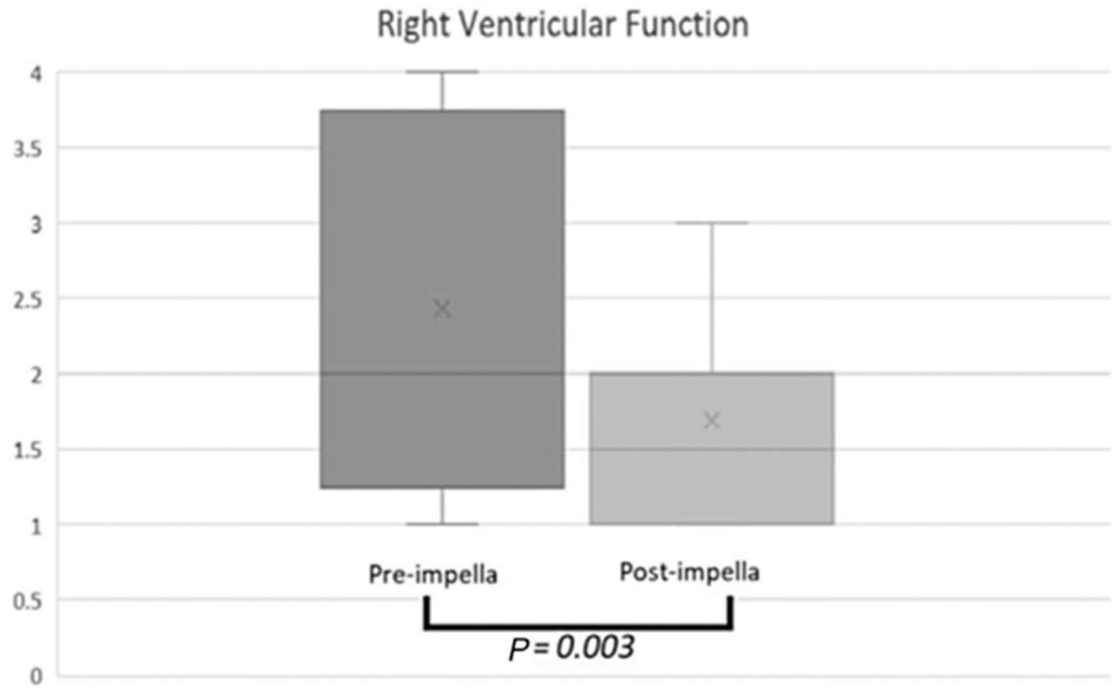
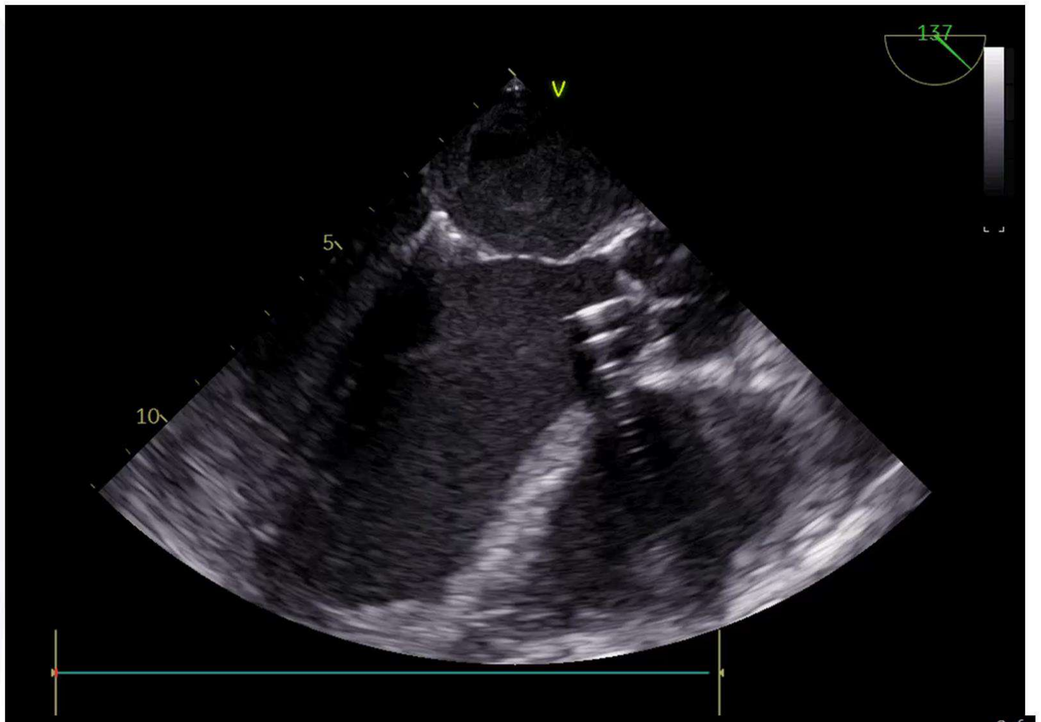


Table 5 Haemodynamics and pressor requirements

Parameter	Pre-Impella Median (range)	Post-Impella Median (range)	Post-transplant Median (range)	*P* value Pre- and post-Impella	*P* value Pre-Impella and post-transplant
PA systolic, mmHg	45.5 (35–75)	36 (26–51)	37 (23–46)	0.001	0.004
PA diastolic, mmHg	23.5 (17–37)	17 (11–33)	16 (8–20)	0.002	0.001
PCWP, mmHg	21 (15–32)	15.5 (11–33)	—	0.011	—
RA pressure, mmHg	8.5 (3–22)	3.5 (2–12)	7 (2–16)	0.018	0.608
PAPI	2.56 (0.86–10)	4.2 (1.3–10)	3.45 (1.1–10)	0.048	0.367
PVR, dynes-s/cm^5	228 (80–576)	115 (50–292)	99 (70–142)	0.006	0.001
Pressors, %	15 (94%)	14 (88%)	16 (100%)	1	1
Vasoactive-inotropic score	5 (2.5–17.5)	5 (2.5–10)	5 (2–9) at 24 h 4 (1–6) at 72 h	0.064	0.455 0.030
Impella power	—	6 (4–8)	—	—	—
Impella flow	—	3.85 (2.1–4.6)	—	—	—

PA, pulmonary artery; PAPI, pulmonary artery pulsatility index; PCWP, pulmonary capillary wedge pressure; PVR, pulmonary vascular resistance; RA, right atrial.

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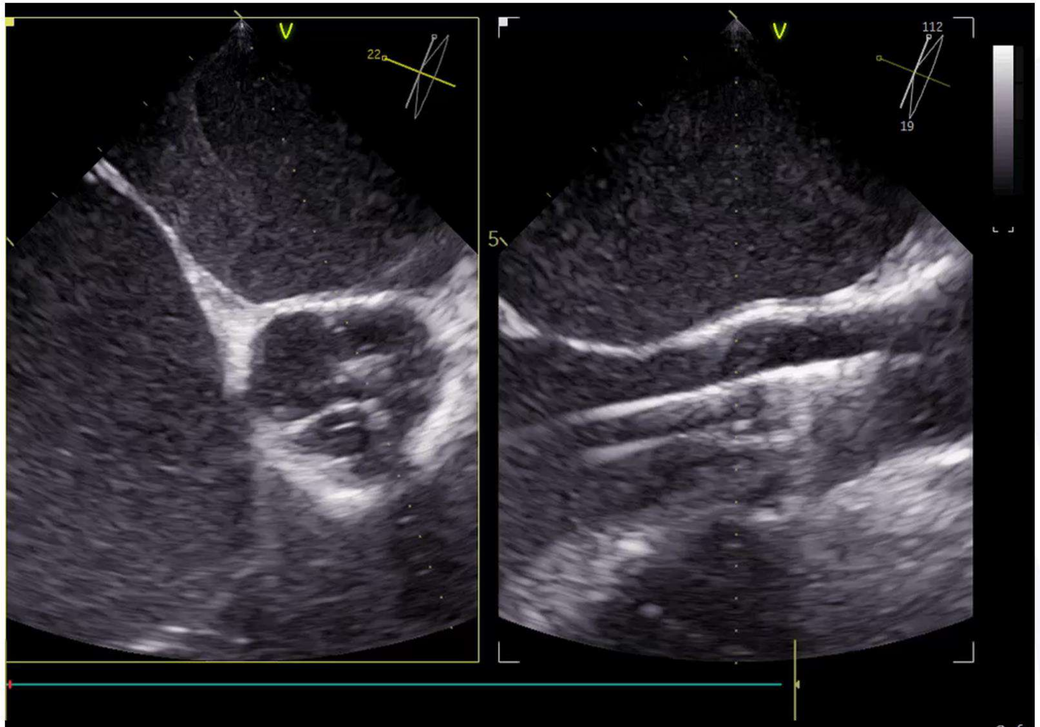
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112
19
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Soft
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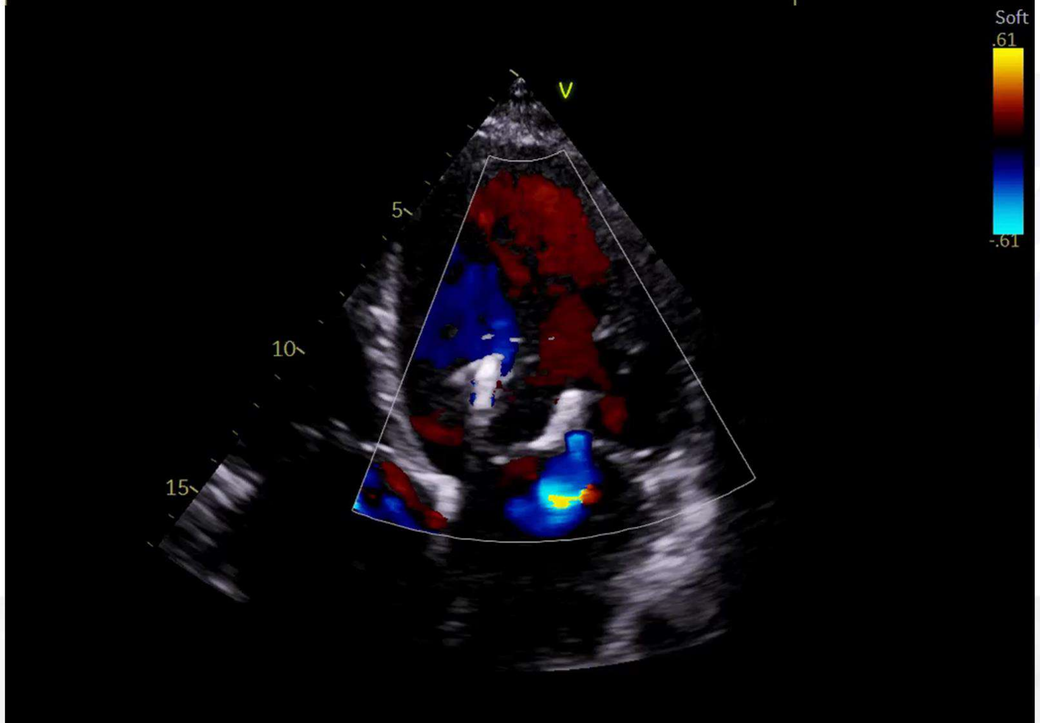
Soft
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-.61
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B D (introdotto dal dott. M) paziente già discusso nei precedenti HT ed impiantato con Impella chirurgico (5.5), il Dott. [redacted] ha esposto al paziente la possibilità del [redacted] TAH o in alternativa l'impianto di ECMO in considerazione del coinvolgimento biventricolar. Il dott. G[redacted] evidenzia gli esami stabili e una curva pulsatile del ventricolo sn scomparsa del tutto. Risulta totalmente dipendente dalla macchina, la diuresi è buona, la creatinina si sta lentamente normalizzando (ad oggi è 1.4 da 5.4 preimpianto), la azotemia è in discesa (quasi normalizzata), la bilirubina totale e indiretta risultano aumentate ma stabili ed il proBNP si sta lentamente riducendo (da 31000- 26000 a 13000) con una pressione diastolica polmonare di 33 mmHg. Se non dovesse arrivare un'offerta di cuore il Dott. M[redacted] riflette sulla possibilità di upgrade ad ECMO

Decisione finale: Al minimo peggioramento clinico si procede al [redacted] TAH [redacted] se il virtual fitting è permissivo. Il dr. A[redacted]i provvede all'invio delle immagini TAC.

Università degli Studi della Campania Luigi Vanvitelli

UNIVERSITA' DELLA CAMPANIA LUIGI VANVITELLI
DIPARTIMENTO DI SCIENZE MEDICHE TRASLAZIONALI
CATTEDRA DI CHIRURGIA CARDIACA
SCUOLA DI SPECIALIZZAZIONE IN CARDIOCHIRURGIA
Direttore: Prof.ssa Marisa De Feo

OSPEDALI DEI COLLI
MONALDI - COTUGNO - C.T.O.
"AZIENDA OSPEDALIERA SPECIALISTICA DEI COLLI"

AZIENDA OSPEDALIERA DEI COLLI
OSPEDALE MONALDI
DIPARTIMENTO DI CARDIOCHIRURGIA E DEI TRAPIANTI
Direttore: Prof.ssaMarisa De Feo

Verbale riunione team multidisciplinare per valutazione pazienti da inserire in lista di attesa per trapianto di cuore.

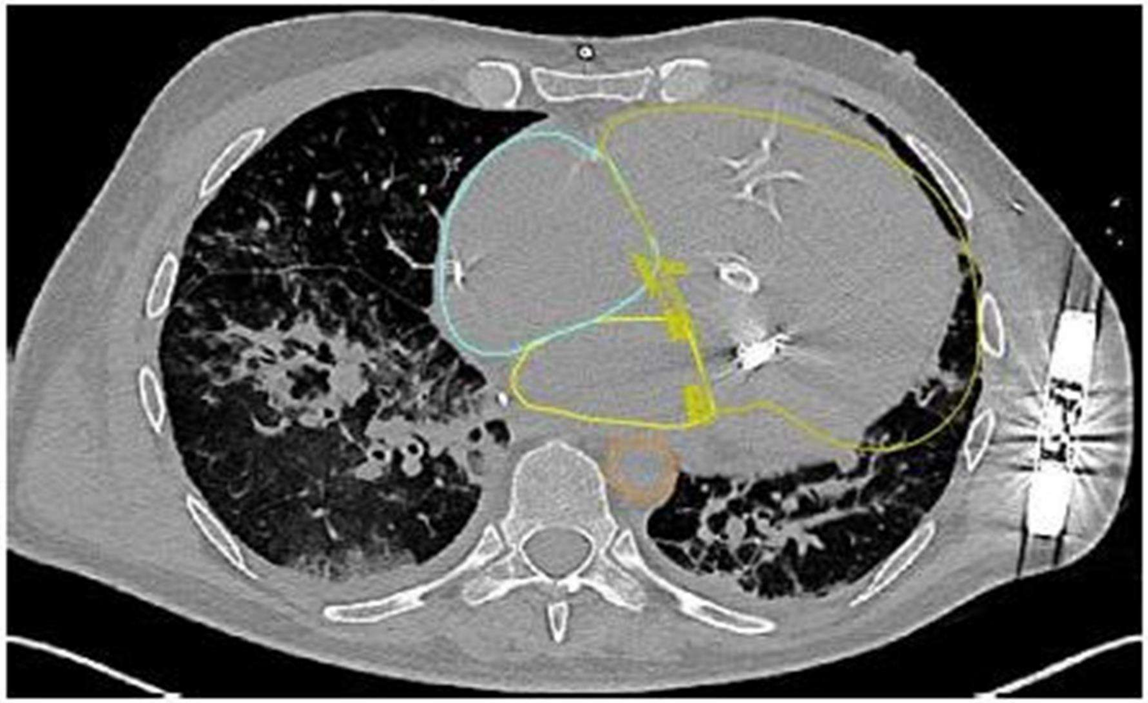
Il giorno 5 dicembre 2024 alle ore 14.15, presso la sala riunioni del Centro Trapianti, si è riunito il team multidisciplinare in urgenza per discutere l'argomento di cui in oggetto.

AST/ALT	6/7 URL
Bilirubina	5.4
PVR	1,75
RAP	15 in incremento
PCWP	32
Insvezzabile	pLVAD 5.5

Progressive RHF

PATIENT MEDICAL STATUS:

- Overt onset with multiorgan failure
- Bad right ventricular failure despite prolonged Impella support
- Undisclosed mitral stenosis (Mitraclip)
- Pulmonary hypertension recovered with Impella

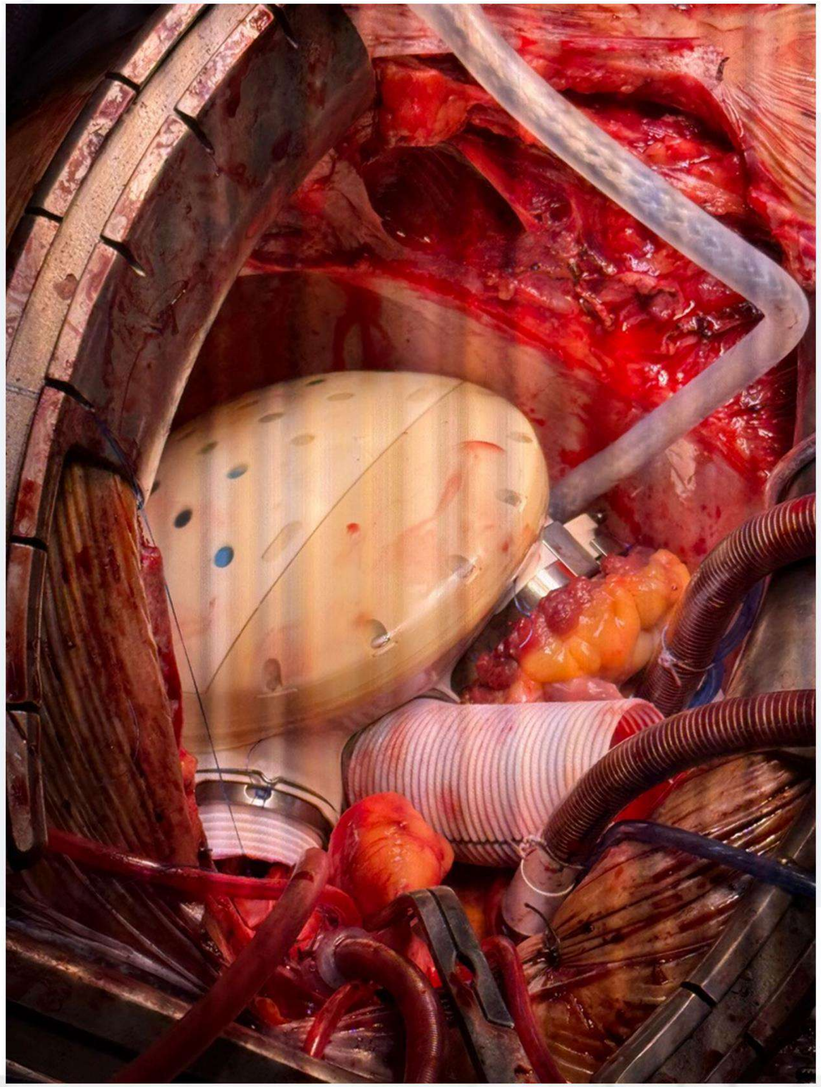


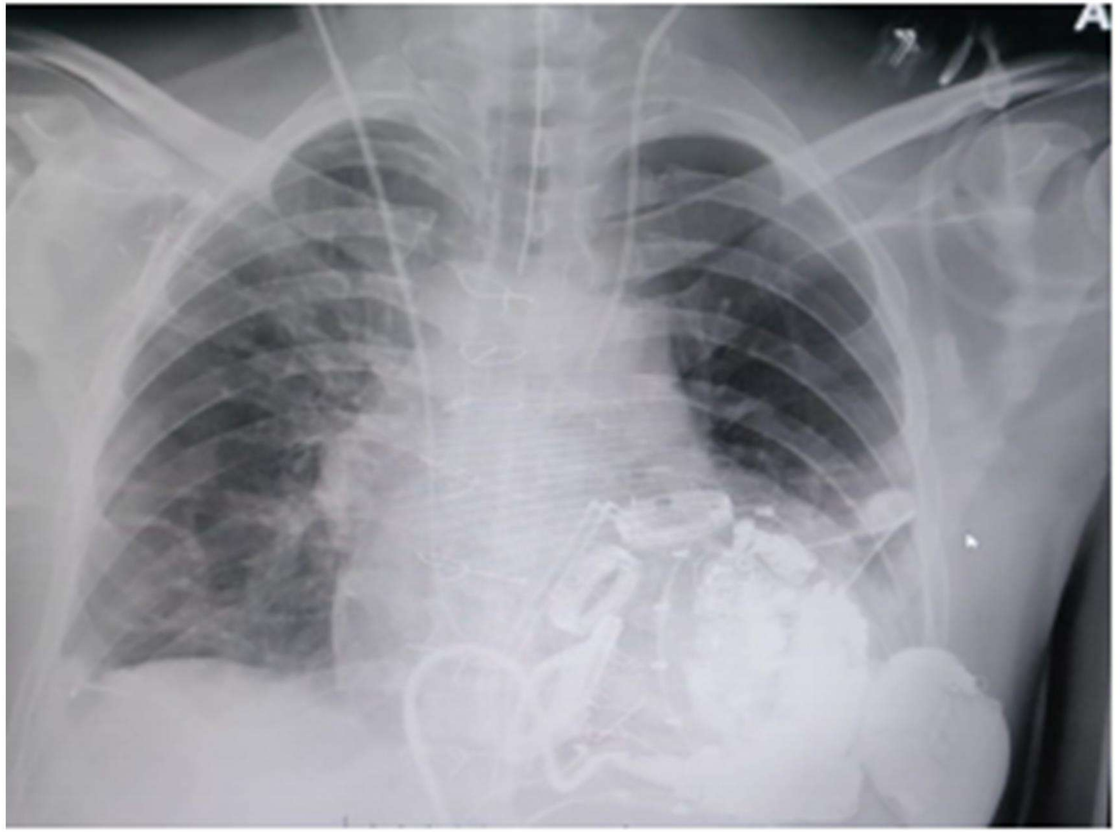
Anatomical Measurements	Spine to Sternum distance (mm)	121
	Pulmonary artery to diaphragm distance (mm)	122
	Pulmonary artery suture distance available (mm)	43
	Volume of ventricles (L)	1.08

PATIENT MANAGEMENT

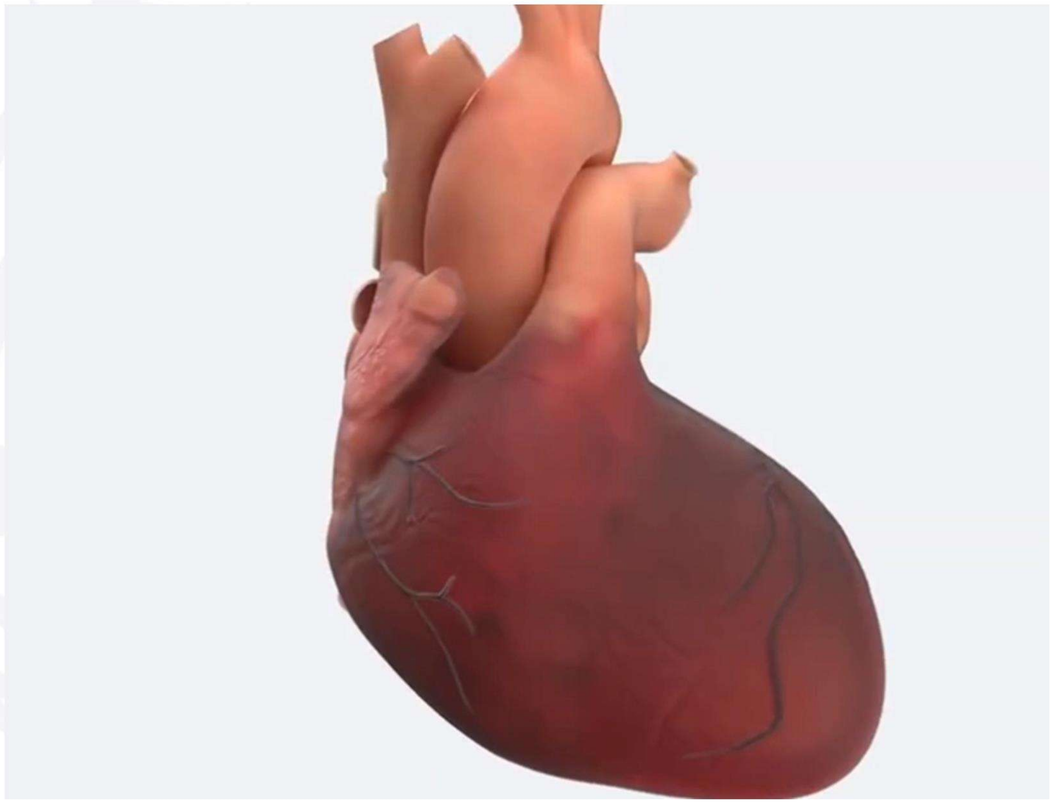
31.10	Hospital admission
01.11	MOF (Renal Failure, High MELD, Lactates, High Pulmonary Resistances)
02.11	IABP and CRRT
08.11	• Lab Value improved • PVR Improved ➔ Heart Team
09.11	• Urgent Waiting List (level 2 IABP)
15.11	• Hemodinamically stable. • IABP ineffective removal attempt
26.11	• Worsening. Inotropic therapy • Axillary Impella 5.5 Implanted
26.11	• Surgical revision of axillary pocket
27.11	• Extubated. Still on Urgency Level 2 (ICU from 1 month.
04.12	• CT scan submitted to Carmat
05.12	• Clinical Call for Clinical Management • Surgery postponed for suspect pneumonia
11.12	• Call for surgical managment and fix the day of surgery

Total Artificial Heart

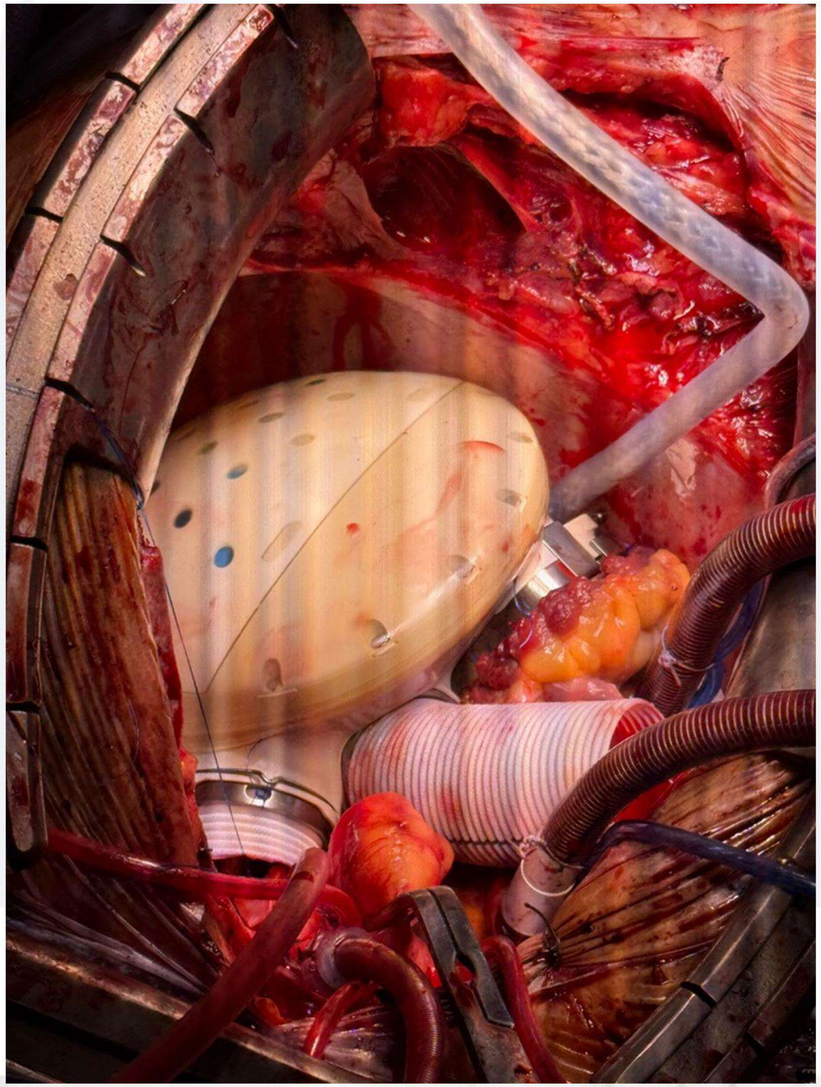


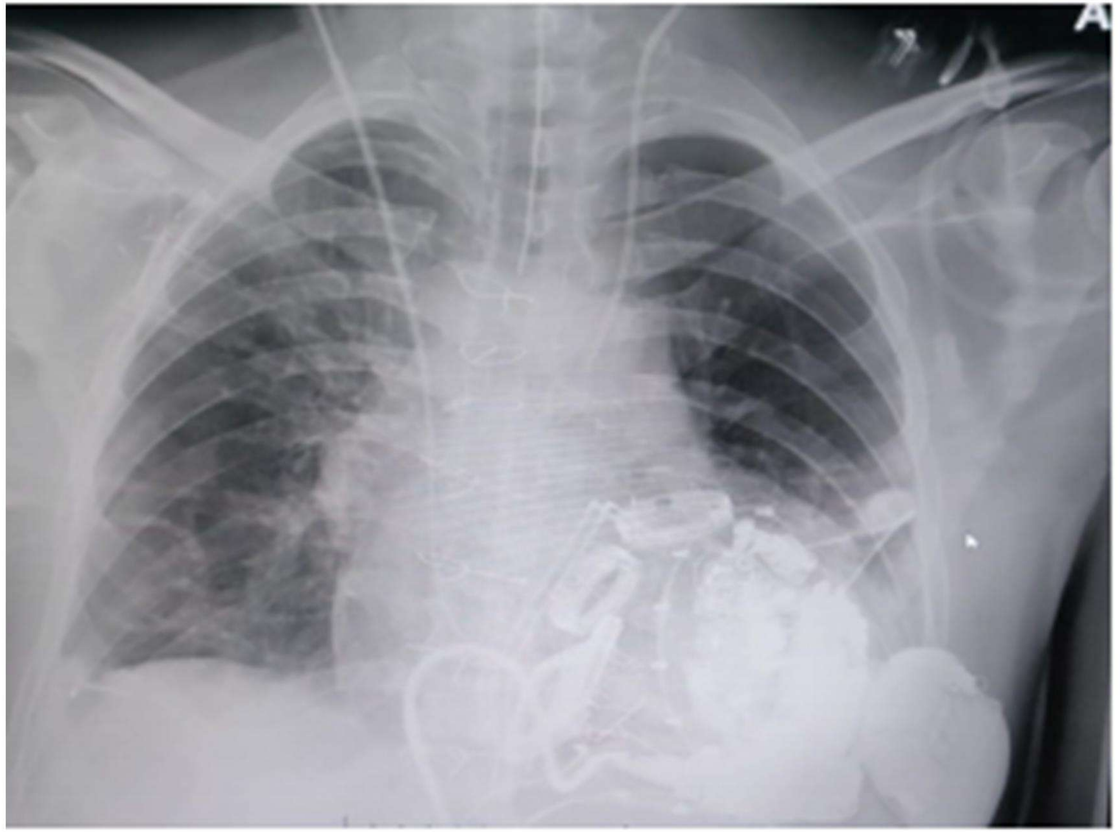


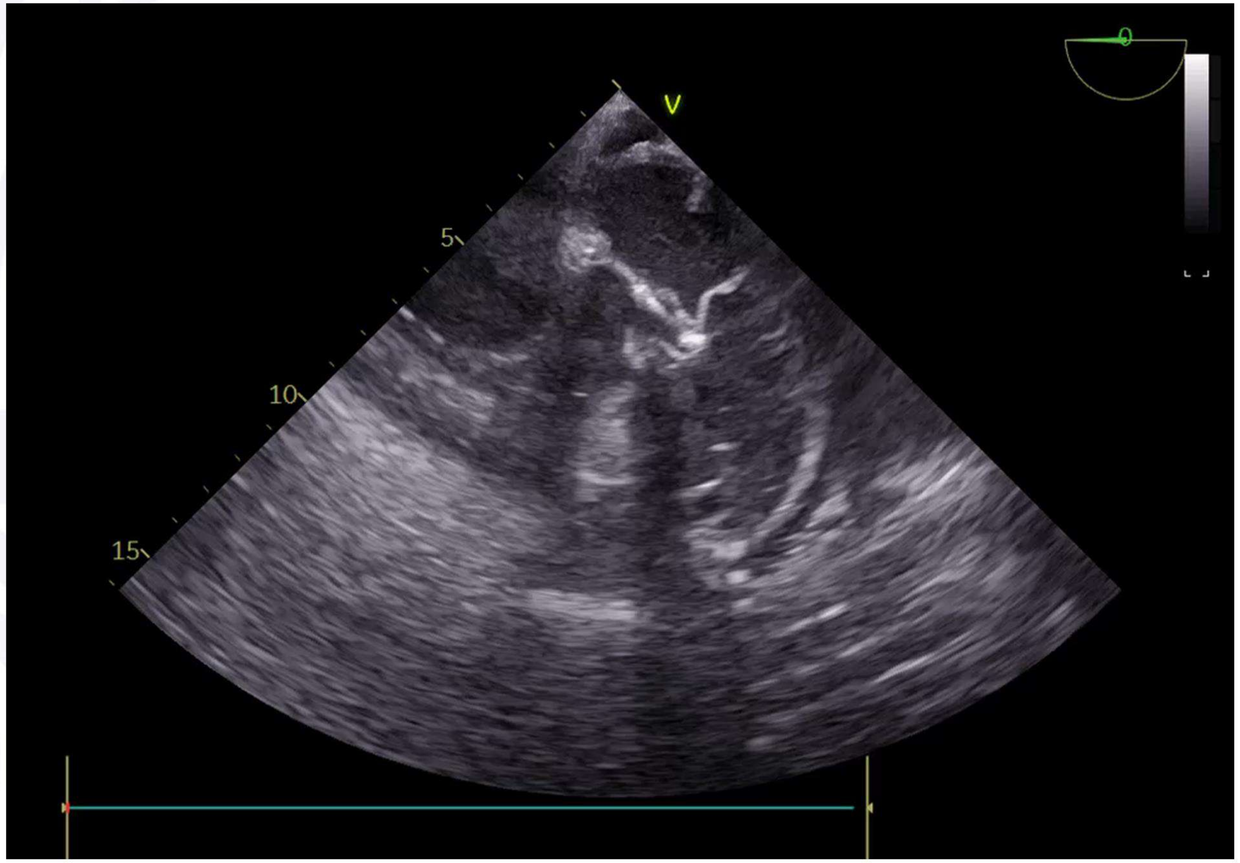
Total Artificial Heart



Total Artificial Heart



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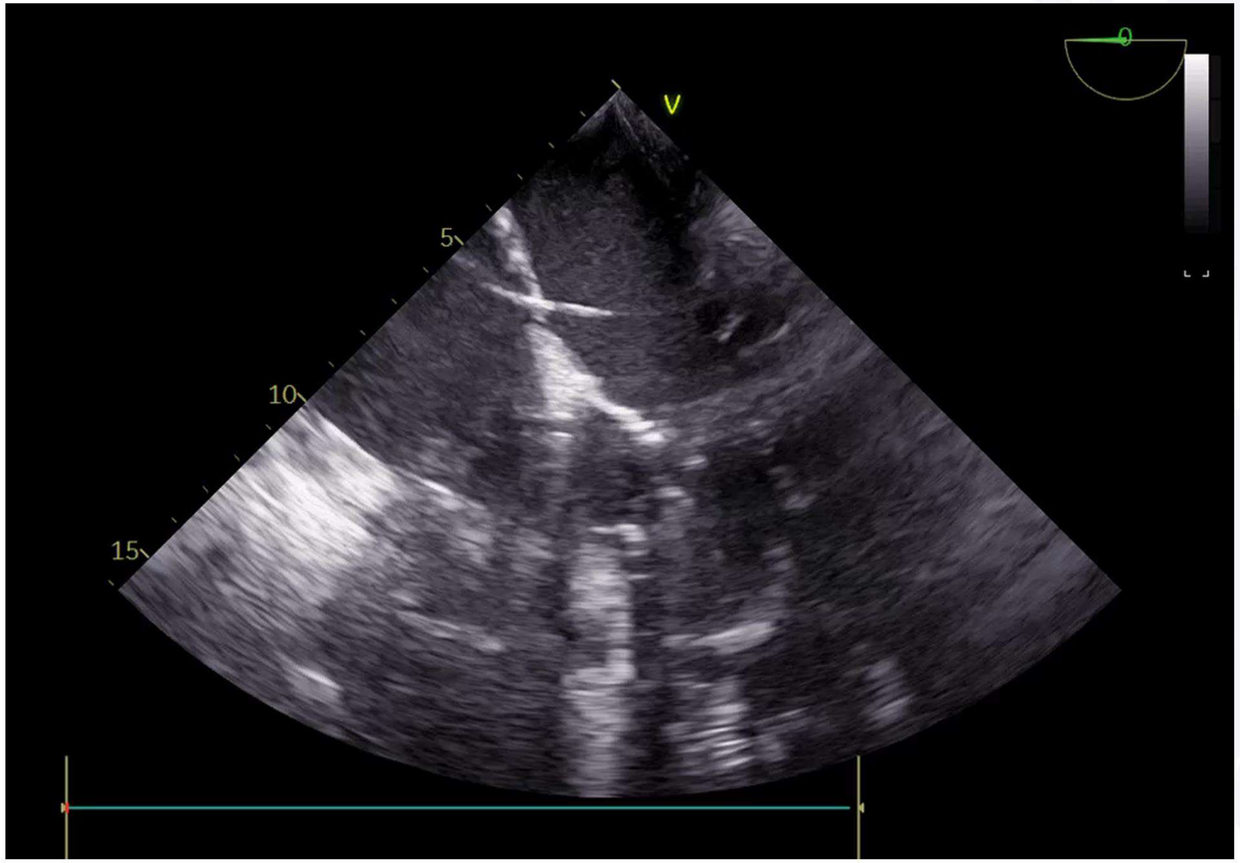
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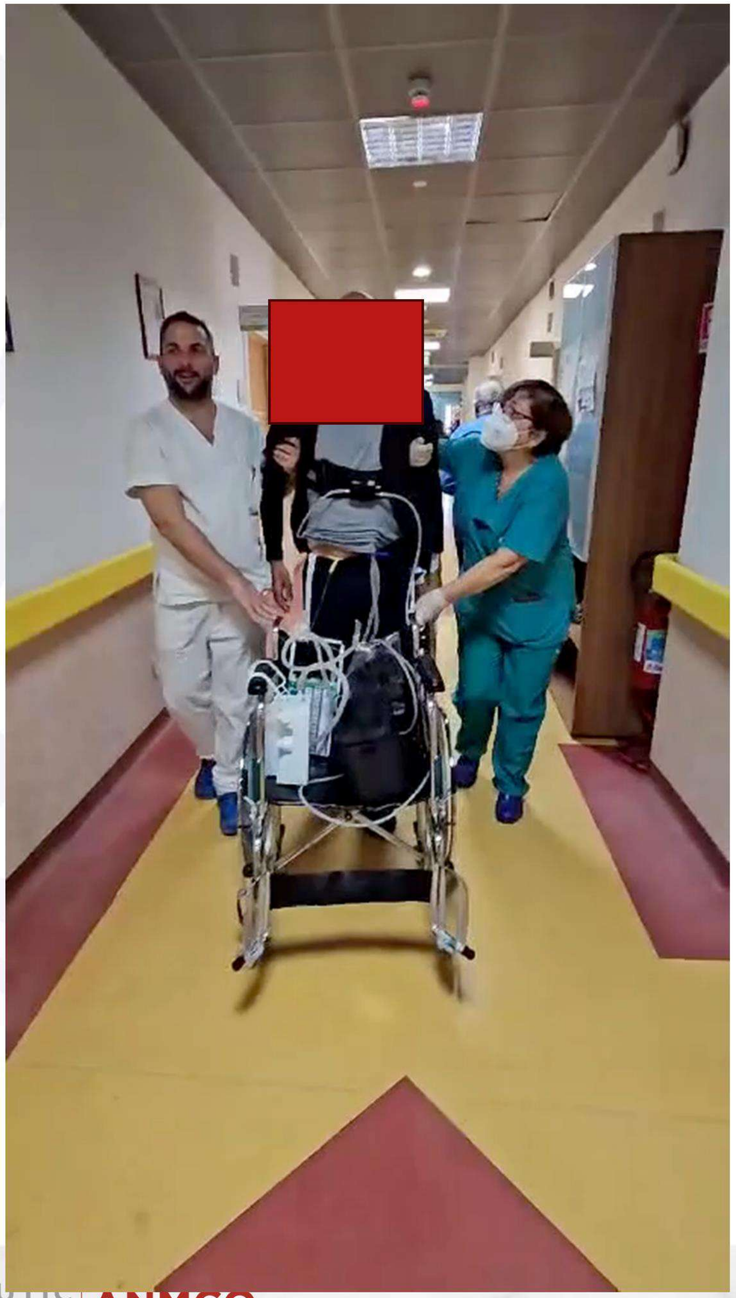
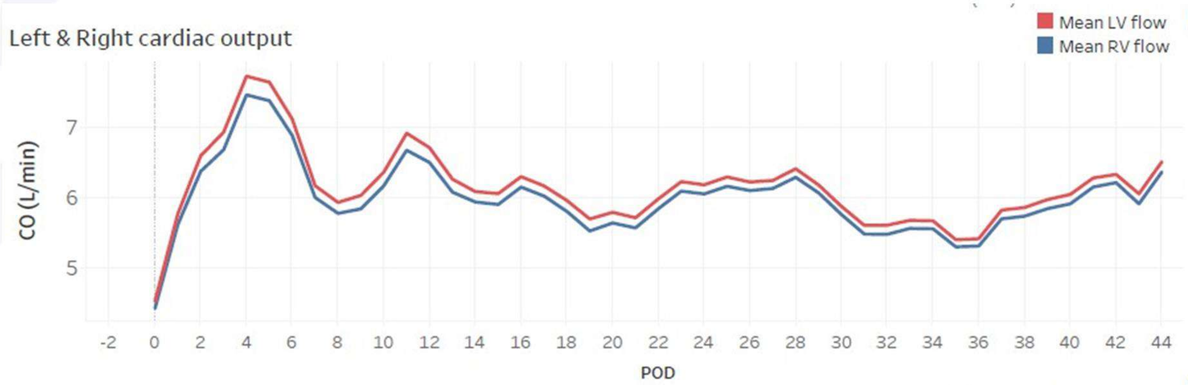
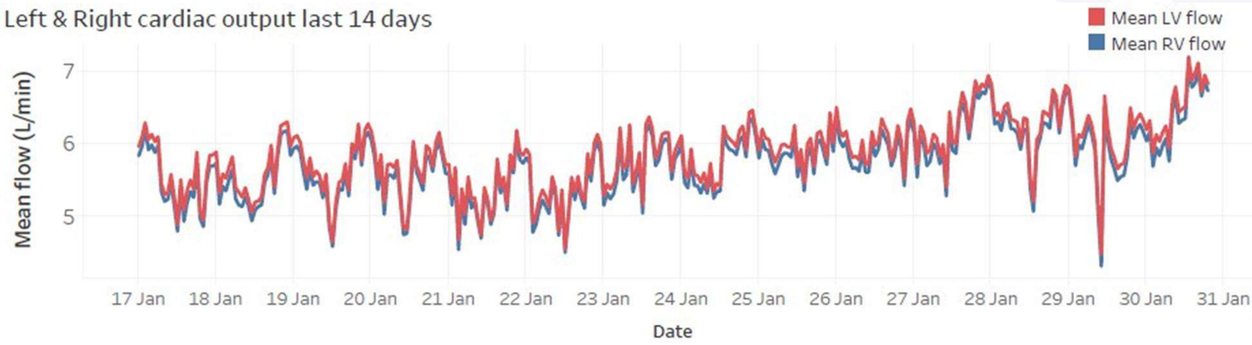
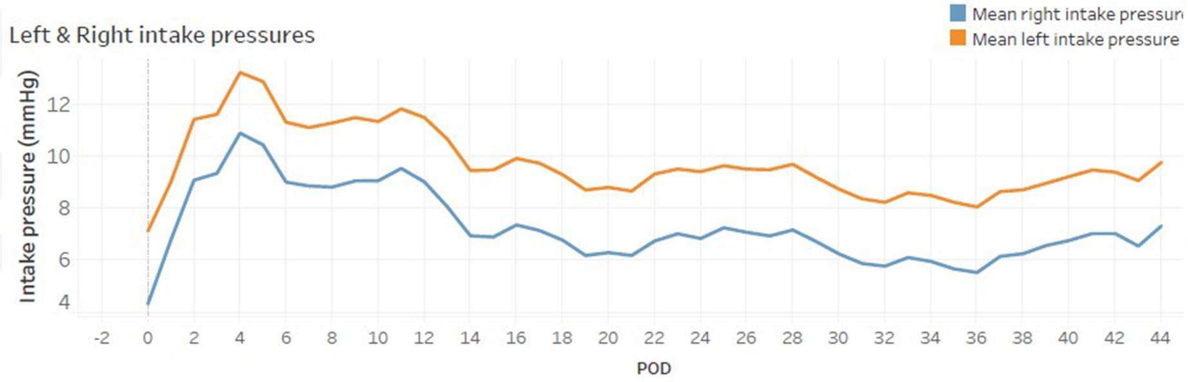
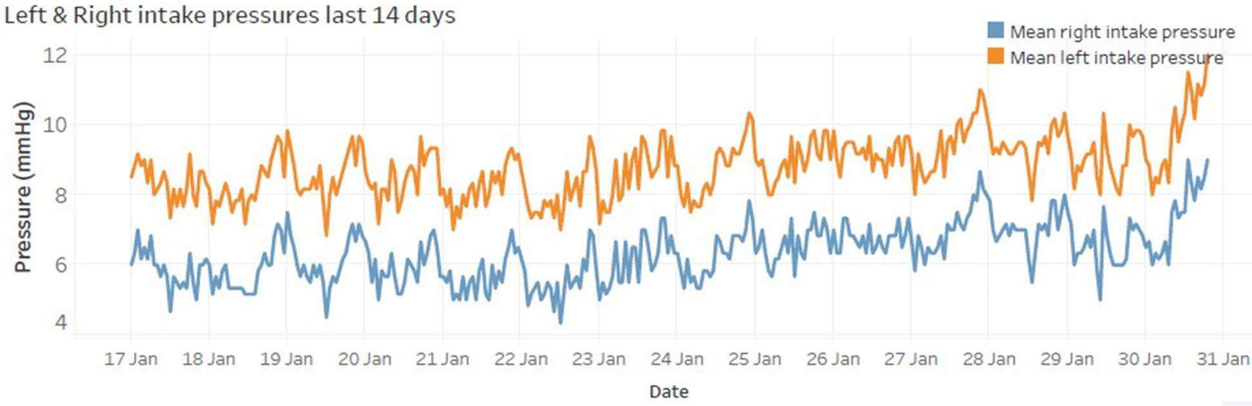


HEMODYNAMIC REPORT



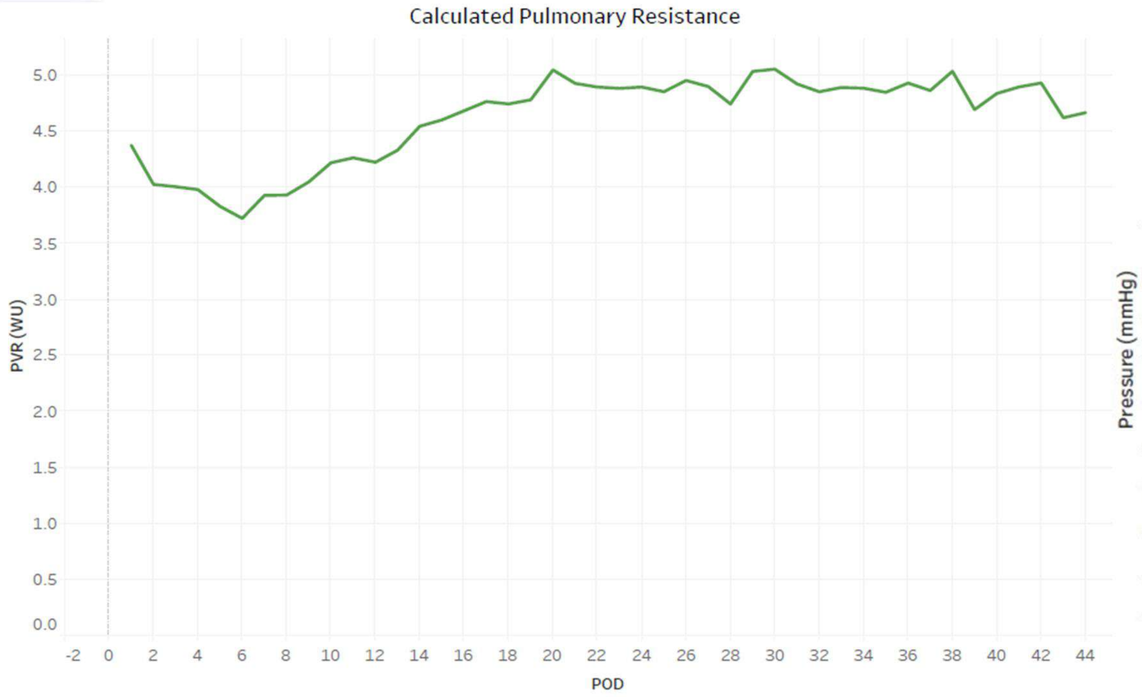


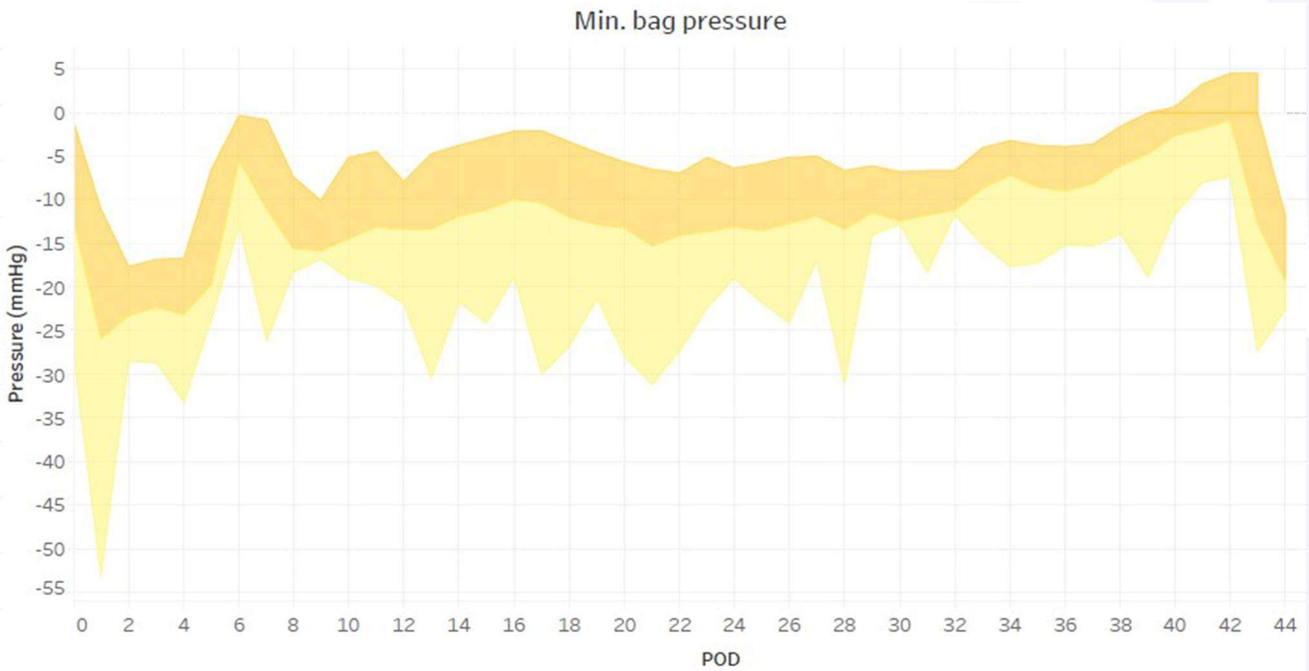




OBSERVATIONS: Tendency to overflow and hypertension. How to manage?

HEMODYNAMIC REPORT UP TO DAY 44





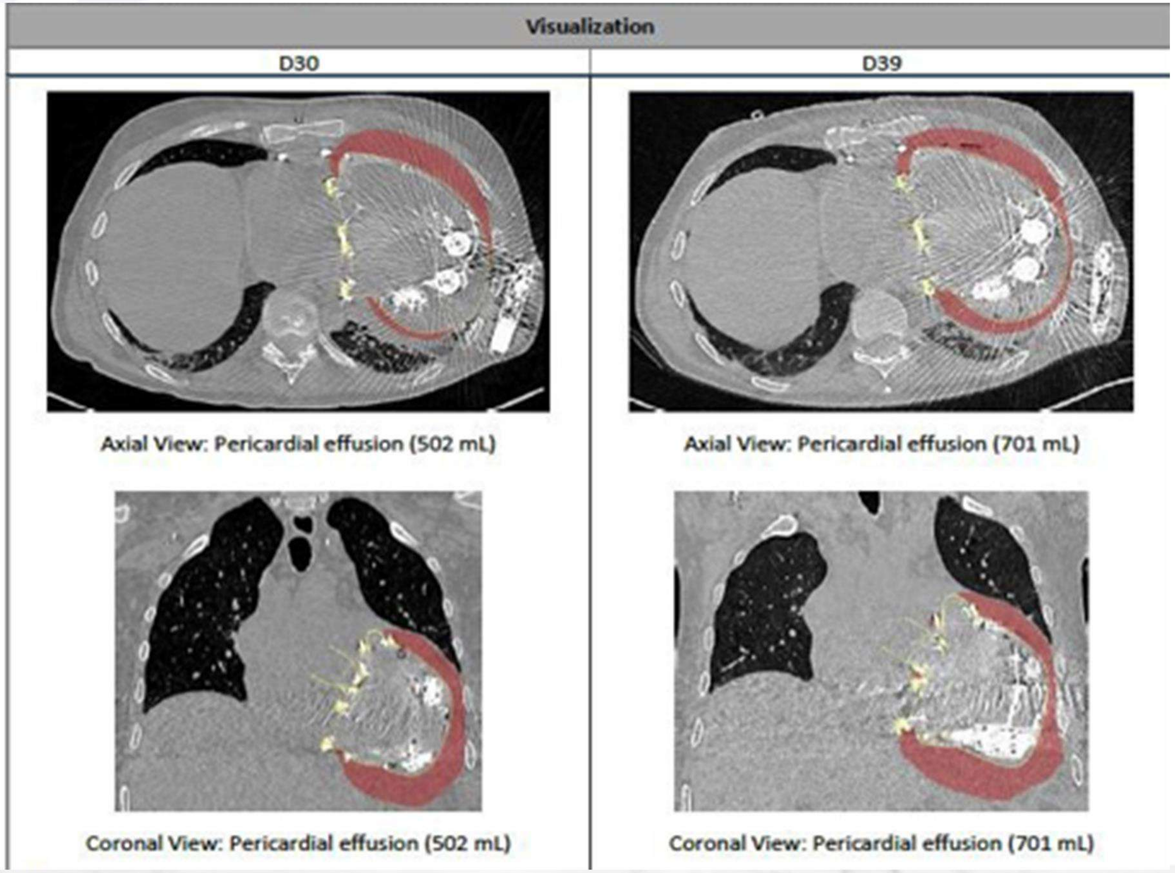
OBSERVATIONS: No issues with pulmonary hypertension. Bag pressure was truly useful to manage the patient and drive the reopening.

Day 29
- CT scan➔ Effusion stable
- Bag pressure increased

Day 37
- CT scan➔ Effusion increased
- Bag Pressure High with stable output➔ Surgical revision?

Day 39
- CT scan➔ Serious effusion
- Bag pressure high➔Surgical Revision

Day 42
- Deep Swab positive➔Emergency List



esami ematochimici: WBC 20820 (N 17360 L 1290) stabili. , Hb 10, PLT 427 000, PCR 12.64. Iposodiemia e iperpotassiemia.

Colturali rilevanti:
1 set EMC del 13/: negativi
Colturale espettorato 14/01: negativo
URC del 14/01: negativo
Tampone multipli siti profondi del 16/01: pos per MRSE
Tampone ferita sternale del 17/01: negativo
Tampone ferita del 20/01: in corso, preliminarmente negativo
PCR per clostridiumtossinogeno 21/01: neg

CONSIGLI TERAPEUTICI: sospendeTygacil da 50 mg/12h (da infondere in 1 ora circa).
Inizia Meropenem 2 gr in 100 cc di SF ev ogni 8 h (infusione di 3h). Inizia Daptomicina 700 mg in 20 cc di SF in bolo lento di due minuti una volta al giorno.