

Clinical case

Physiopathological based approach for mechanical circulatory support titration

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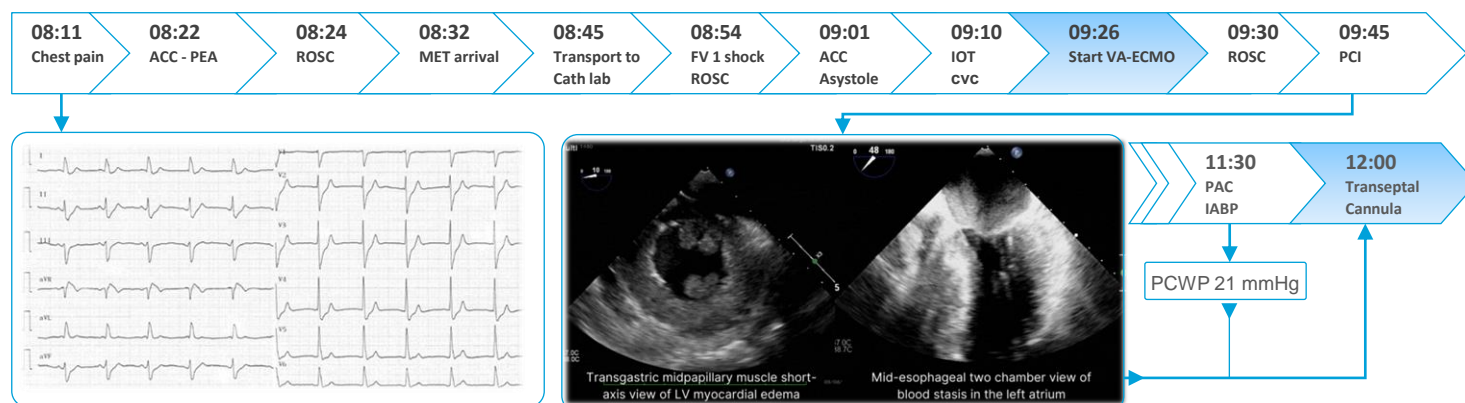
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Case presentation

A 67-year-old man with a history of hypertension presented with recurrent chest pain and diagnosed with non-ST-elevation myocardial infarction (NSTEMI).

Cath lab

The patient's condition worsened despite medical therapy and he developed cardiogenic shock, resulting in cardiac arrest that required extracorporeal venous-arterial membrane oxygenation (VA-ECMO). Coronarography revealed multivessel disease with common trunk occlusion, which was treated. Echocardiography demonstrated a severe LV dysfunction with severe myocardial oedema, mitral regurgitation, blood stasis at level of left atrium and a barely opening aortic valve.

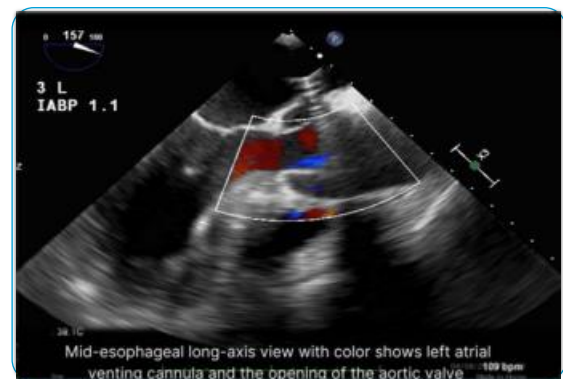


Physiopathological driven suggested pathway:

Evidence of severely hypertrophied LV related to long-standing hypertrophic cardiomyopathy and myocardial oedema (Restrictive LV physiology). The placement of an atrial transeptal cannula resolved the congestion with the restoration of flow though PV with additional IABP to offload the LV.

The echocardiographic assessment, on top of haemodynamic continuous monitoring, should be performed throughout the MCS validation process/placement, soon after ECMO placement.

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ICU ward



NSE(48h-72h)			66,5 ng/mL	23,4 ng/mL			
Native lung VAM	12 BPM	5 BPM	10 BPM	10 BPM	10 BPM	10 BPM	10 BPM
Membrane lung GF	3 L/m	2 L/m	5 L/m	3,5 L/m	2 L/m	2 L/m	2,5 L/m
ECMO BF	3 L/m	3,5 L/m	4 L/m	4 L/m	4 L/m	4 L/m	3,8 L/m
Vasopressor	↔	↓	↔	↓	↓	↓	↓
HsTNI	↑690350 ng/L	↑813730 ng/L	↓309830 ng/L	↓187700 ng/L	↓137490 ng/L	↑190910 ng/L	↓80404 ng/L
BNP	40 pg/mL		95 pg/mL		239 pg/mL	357 pg/mL	396 pg/mL
PVC	7 mmHg	10 mmHg	14 mmHg	10 mmHg	8 mmHg	10 mmHg	9 mmHg
PCWP	15 mmHg	13 mmHg	16 mmHg	16 mmHg	13 mmHg	15 mmHg	20 mmHg
SVO2	65%	63%		69%	45%	60%	
Transeptal cannula Q	1,5 L/m	1,5 L/m	1,5 L/m	1,5 L/m	1,5 L/m	1,4 L/m	1,4 L/m
CRRT		√	√	√		√	√
Ecocardiography	IVS,AW,PW 20 mm				IVS,AW,PW 17 mm		IVS,AW,PW 15 mm

A high dose steroid was administered at day 5 resulting in a significant reduction in ventricular thickness allowing Levosimendan infusion with normalization of right ventricular systolic function but insufficient recovery of LV function.

A step-down to isolated left-sided support (t-LVAD) was then performed. At that time, cardiac transplantation and LVAD as destination therapy were contraindicated due to the patient's age, severe hemodynamic and multi organ failure and ongoing sepsis. The cannulation setting was changed to achieve anterograde perfusion and favour LV afterload. Unfortunately, the infection turn into septic shock leading to patients exitus on the 21th day of hospitalisation.

Take home message

Beside the prompt institution of MCS in case of overt cardiogenic shock, appropriate monitoring (invasive, echocardiographic) and management titrated on patient's phenotype (corticosteroid, Levosimendan) and specific pathophysiological milieu may allow to step-up/step-down to proper MCS configuration favouring patients/device interaction and improving cardiac function.