

MECHANICAL CIRCULATORY SUPPORT IN CARDIOGENIC SHOCK

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Potential conflict of interest:

- None to declare



Declaration of interest

- I have nothing to declare



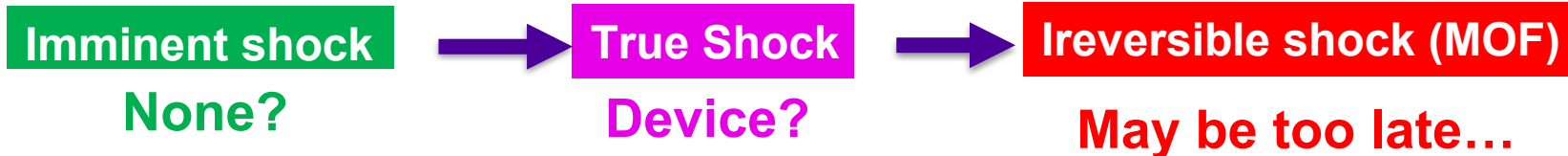
THE AIM OF HEMODYNAMIC SUPPORT IN CARDIOGENIC SHOCK

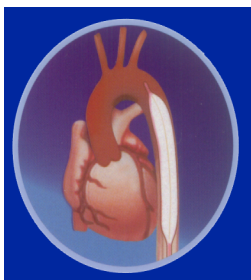
- To improve organ perfusion before PCI
- To manage hemodynamic instability during PCI
- To „buy time“ for myocardial recovery after PCI or if the cause is reversible
- Bridge to LVAD/Tx



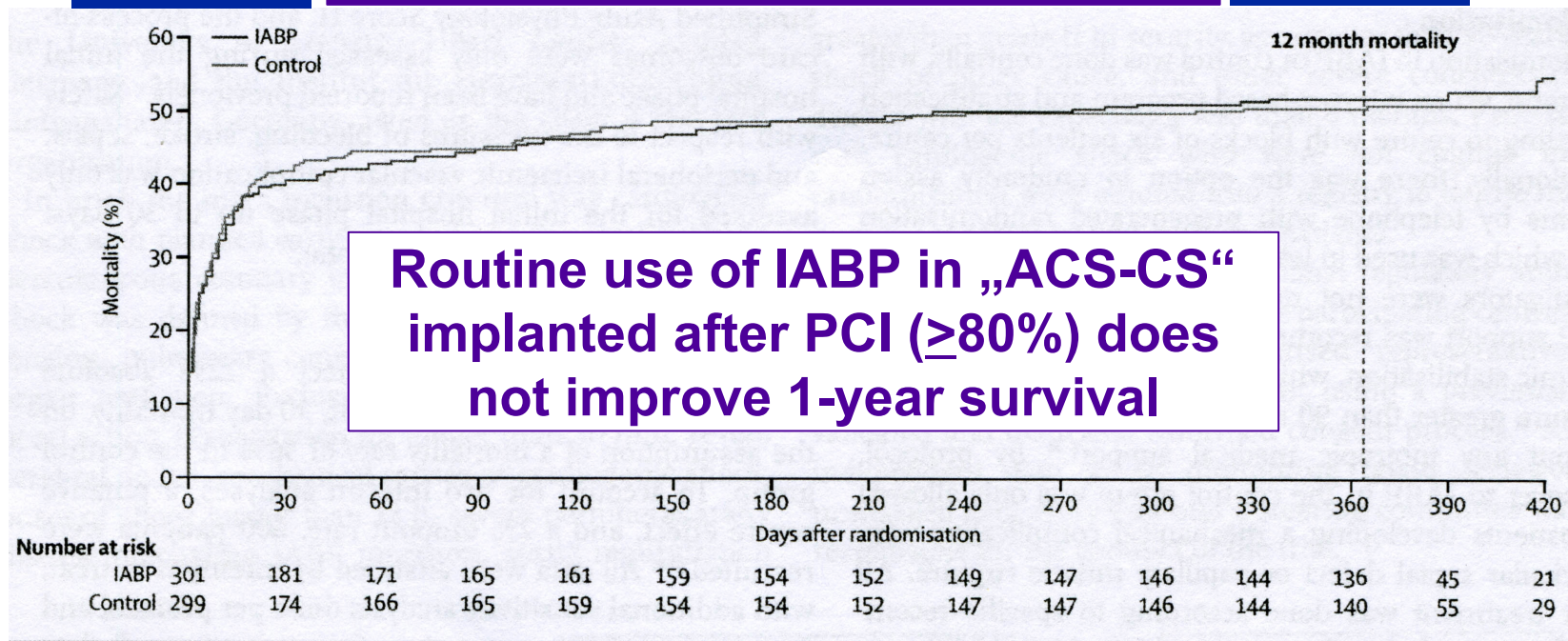
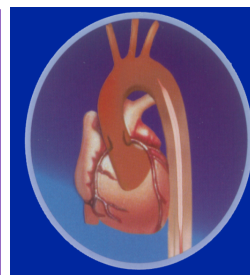
CS IS HETEROGENOUS AND NOT A „YES OR NO“ PHENOMENON

- Study definition: $SAP < 90$ mm for > 30 min or need for vasoactive drugs + pulmonary congestion + end organ perfusion failure
- Clinical reality?
 - Different etiology: Coronary, non coronary...
 - Different patient age, comorbidities...
 - About 50% comatose survivors of CA-brain recovery major determinant of the outcome
 - Different mechanism: LV/RV shock, pump failure/mechanical defect...
 - Different timing: On admission/during/after PCI (early) or during CICU stay (late)
 - Different severity of perfusion failure (arterial lactate, urin output...)



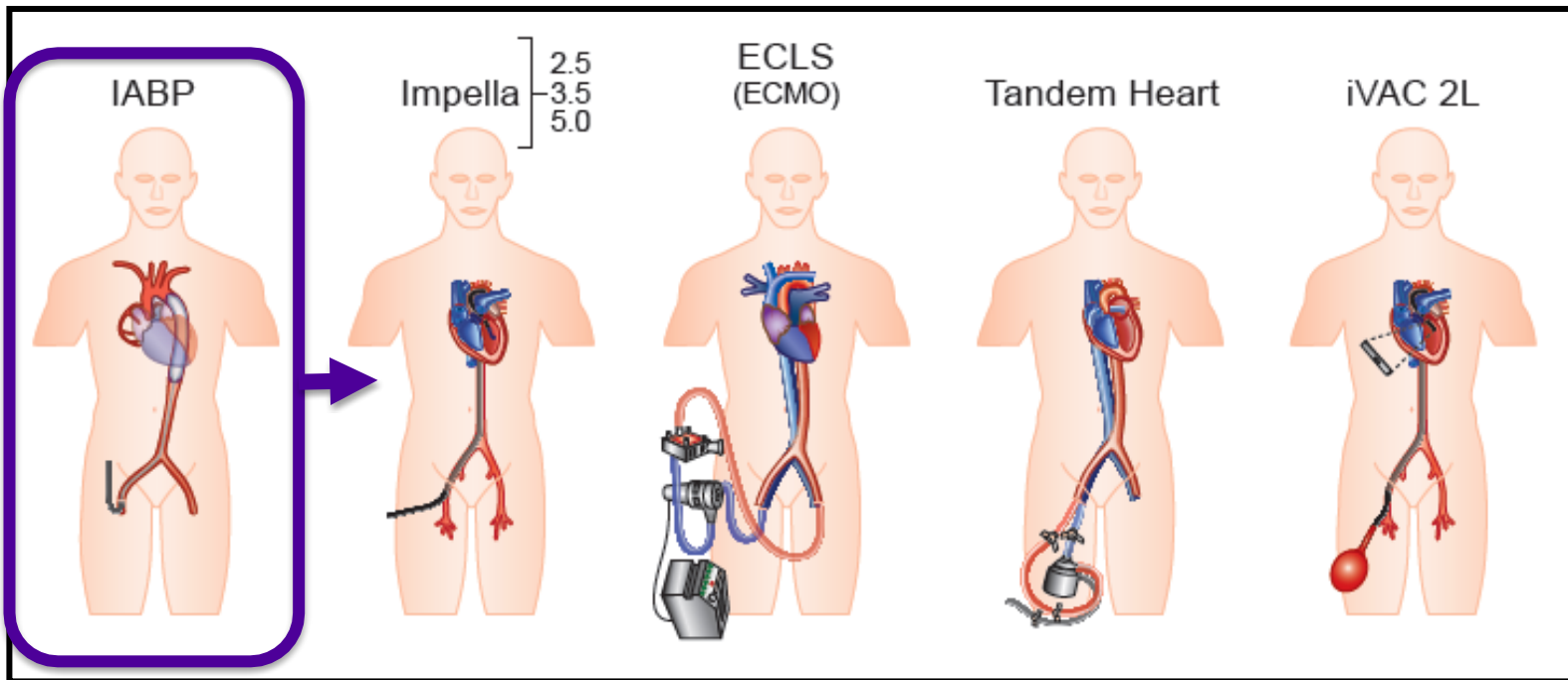


IABP WAS STANDARD OF CARE BEFORE IABP SHOCK II RCT...



Together with

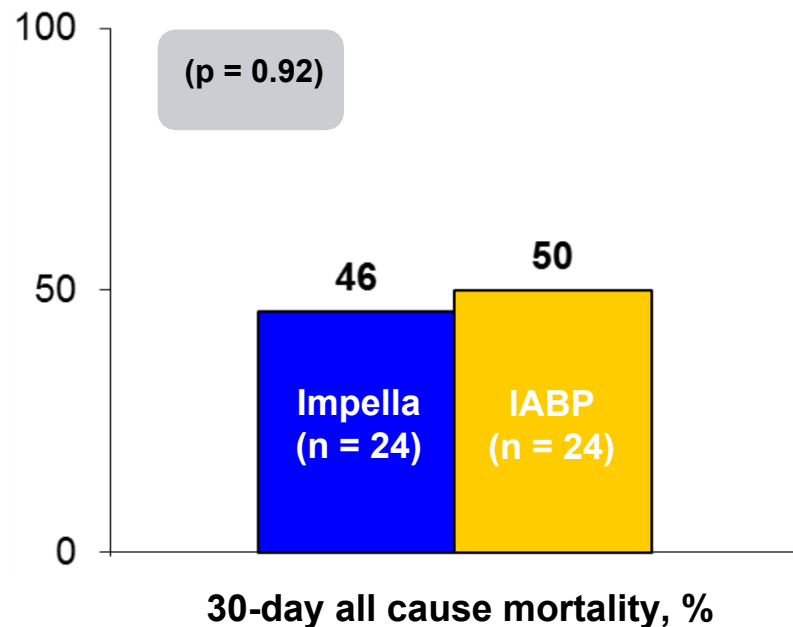
NEXT STEP-SHORT TERM ACTIVE DEVICES ?



- Hemodynamically more effective than IABP
- Unproven survival benefit (underpowered RCT's)
- More complex and associated with more complications

IMPRESS RCT- IMPELLA CP VERSUS IABP

STEMI/CS undergoing P-PCI randomized to Impella CP or IABP



Primary endpoint:

30-day all-cause mortality 46% vs. 50%, p = 0.92

Secondary endpoints:

- Major vascular complication: 4% vs. 0%
- Major bleeding: 33% vs. 8%
- 30-day stroke: 4% vs. 4%
- All-cause mortality at 6 months: 50% vs. 50%, p = 0.92

Underpowered

SEVERAL LARGER ONGOING RANDOMIZED TRIALS (ClinicalTrials.gov)

- **DanShock (NCT01633502)**, Impella CP, 360 patients, ongoing, expanded from Denmark to Germany (DanGer)
- **ECMO-CS (NCT02301819)**, VA ECMO, 120 patients, ongoing, Czech Republic
- **REVERSE (NCT03431467)**, VA ECMO+/-Impella 2.5L, 96 patients, ongoing USA
- **ECLS-SHOCK (NCT03637205)**, VA ECMO, 420 patients, ongoing, Germany

„MECHANICAL SUPPORT DILEMMA“ IN 2019?

Continue with IABP using improved technology (fiberoptic, 50 cc balloon) despite negative RCT ? (2018 ECS/EACTS III)

OR

Skip IABP and use more effective active devices (Impella, VA ECMO...) despite increased complications and no evidence for improved outcome ? (2018 ECS/EACTS IIb)

OR

No mechanical support devices because they have not been yet clinically proven ?



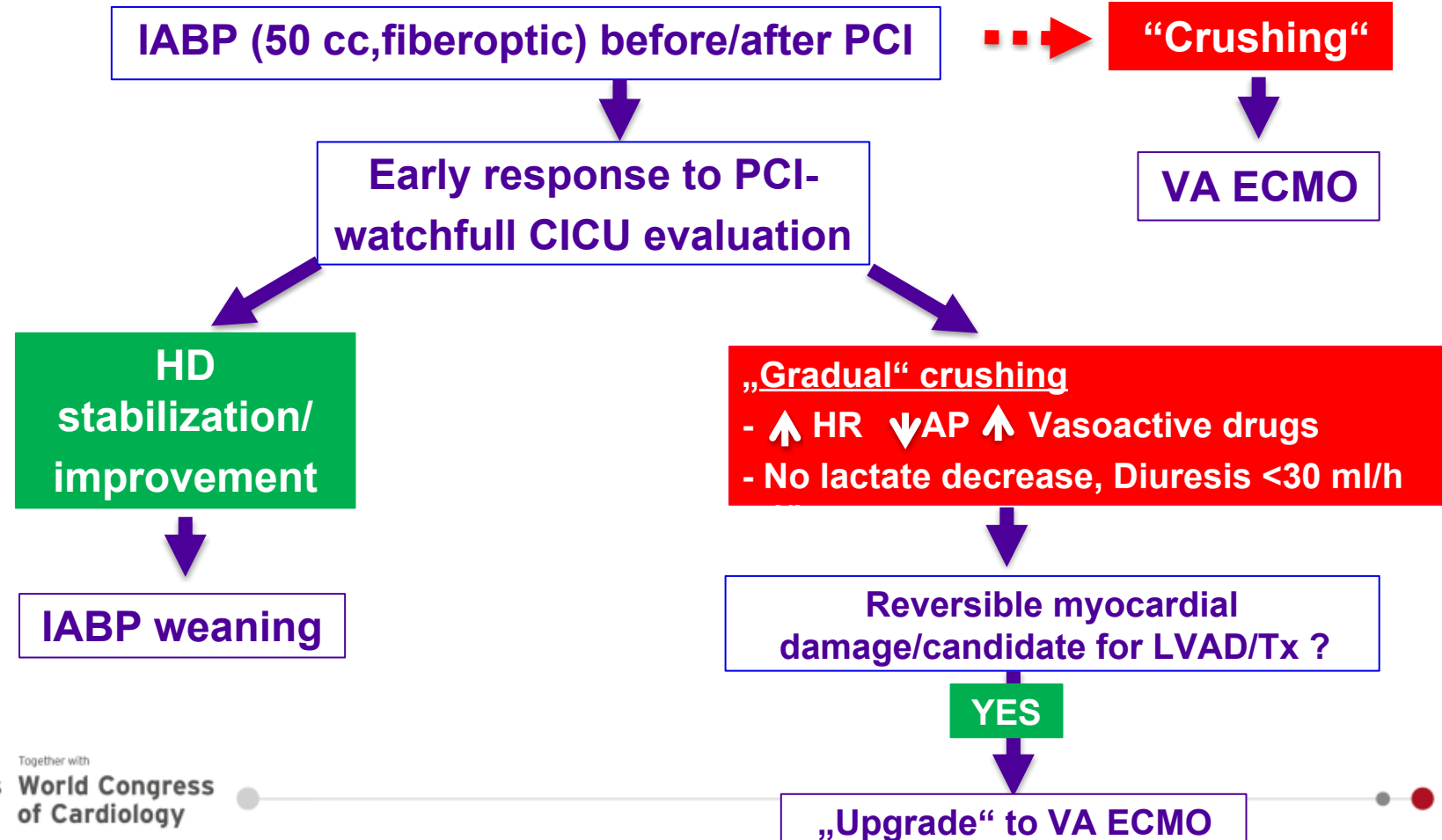
Focus on CS prevention by decreasing delay to reperfusion (STEMI fast track) and use proven treatments only (CULPRIT SHOCK revascularization)

LACK OF SCIENTIFIC EVIDENCE LEADS TO MANY STRATEGIES BASED ON CLINICAL EXPERIENCE...



**...DOING SAME
MISTAKE WITH MORE
CONFIDENCE?**

OUR „HYBRIDE“ STRATEGY IN ACS-CARDIOGENIC SHOCK



BACK TO THE CATH LAB...

- Check PCI result
- Ileofoemoral arteries?
- Percutatenous VA ECMO implantation with upfront placement of anterograde sheath for distal limb perfusion
- IABP may be left in place for possible LV unloading and ECMO weaning
- Back to the CICU...

Emergency percutaneous implantation of veno-arterial extracorporeal membrane oxygenation in the catheterisation laboratory



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KEYWORDS

• catheterisation laboratory
• emergency ECMO implantation

Abstract

Aims: Our aim was to describe our protocol for emergency percutaneous implantation of femoral veno-arterial extracorporeal membrane oxygenation (VA ECMO) in the catheterisation laboratory and to compare its effectiveness and safety with implantation in the intensive care unit and the operating room.

Methods and results: Our retrospective observational study enrolled 56 consecutive patients undergoing VA ECMO implantation in the catheterisation laboratory (n=23), the intensive care unit (n=8) and the operating room (n=25). Among patients undergoing catheterisation laboratory implantation, 11 patients had profound cardiogenic shock but preserved arterial pulsations, and 12 patients had refractory cardiac arrest undergoing automated mechanical chest compression. Using our fluoroscopy-guided protocol, arterial and venous cannulas were successfully implanted and the desired ECMO flow obtained in each patient. There was no vessel perforation/dissection. Moderate/severe GUSTO or BARC 3 and 5 bleeding occurred in 13%. Ipsilateral limb ischaemia occurred in one of eight patients (13%) with upfront perfusion sheath implantation, and in two of three patients (75%) in whom this strategy was not used (p=0.15). There was no infection at the site of cannula implantation. Complications related to implantation in the catheterisation laboratory were comparable to surgical implantation in the operating room and percutaneous implantation in the intensive care unit using ultrasound guidance.

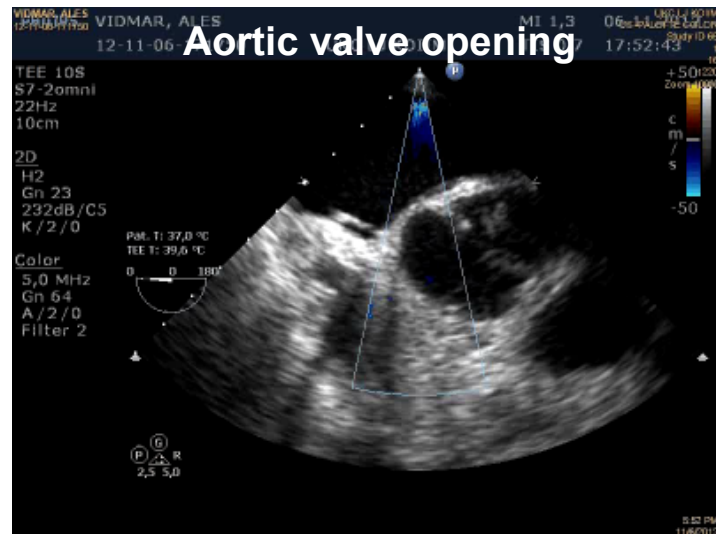
Conclusions: Fluoroscopy-guided emergency implantation of femoral VA ECMO by an interventional cardiologist in the catheterisation laboratory is effective and safe for both patients in cardiogenic shock and those in refractory cardiac arrest.

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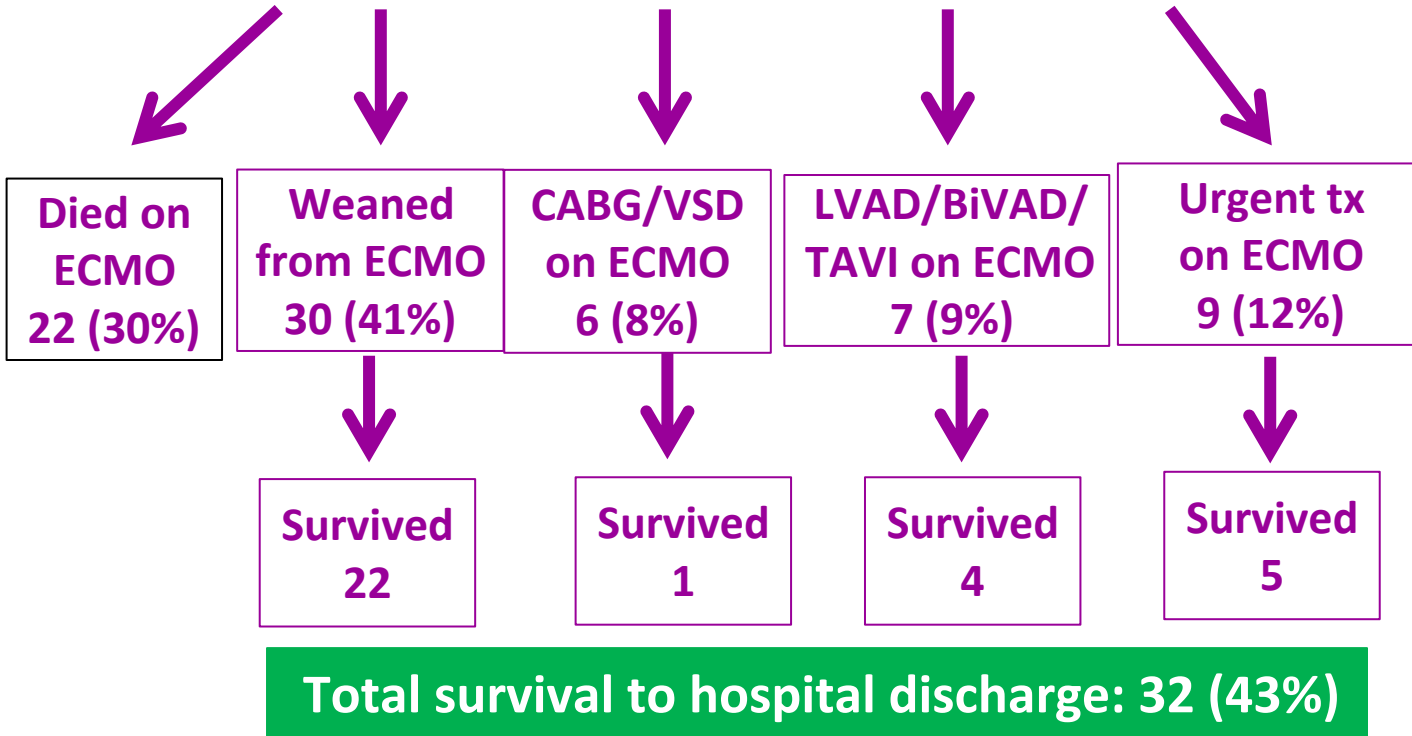
VA ECMO IN CS IN THE CICU

Goal: Adequate systemic perfusion without „killing“ LV by retrograde ECMO flow

- 24-7 bedside echo is essential to monitor LV function/size and aortic valve opening
- Right radial artery and arterial cannula blood gasses (by MV/ECMO sweep gas)
- Monitor distal limb perfusion
- Periodical ECMO flow reduction (1.0-1.5 L/min) to timely diagnose possible LV recovery by echo
- If LV is not improving, start the process for long term LVAD/urgent heart transplant



VA ECMO IN CARDIOGENIC SHOCK REFRACTORY TO IABP (n=74)



CONCLUSION

- CS is heterogenous and complex
- As clinicians we feel that by using HD support, we will improve the outcome
- Optimal strategy still unknown- one size may not fit all...
- In the absence of conclusive RCT's, there is a lot of freedom for different strategies
- Ongoing RCT's with Impella/ECMO will hopefully shape our strategy in the near future

