MINI CORSO

RIANIMAZIONE

Responsabile esecutivo: Emanuele Catena (Milano)

Mercoledì, 23 marzo 2016
3ª Parte: Come migliorare la perfusione d'organo con l'uso di presidi di assistenza al circolo. Tecnica di posizionamento, i problemi pratici di utilizzo di questi strumenti, il controllo dell'efficacia, la valutazione dei risultati, lo svezzamento

Le indicazioni a metodiche di assistenza di livello crescente. Una decisione senza evidenze certe della letteratura che la logica fisiopatologica suggerisce per evitare la perdita del paziente

Antonio Castelli rianimatore,
U.O. Anestesia e Rianimazione
"Ospedale Luigi Sacco"
Polo Universitario
ASST Fatebenefratelli Sacco

Ospedale Luigi Sacco
POLO UNIVERSITARIO
Sistema Socio Sanitario
Regione Lombardia
ASST Fatebenefratelli Sacco

Classes of recommendations	Definition	Suggested wording to use
Class I	Evidence and/or general agreement that a given treatment or procedure is beneficial, useful, effective.	Is recommended/is indicated
Class II	Conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of the given treatment or procedure.	
Class IIa	*Weight of evidence/opinion is in favour of usefulness/efficacy.*	Should be considered
Class IIb	*Usefulness/efficacy is less well established by evidence/opinion.*	May be considered
Class III	Evidence or general agreement that the given treatment or procedure is not useful/effective, and in some cases may be harmful.	Is not recommended

Level of evidence A	Data derived from multiple randomized clinical trials or meta-analyses.
Level of evidence B	Data derived from a single randomized clinical trial or large non-randomized studies.
Level of evidence C	Consensus of opinion of the experts and/ or small studies, retrospective studies, registries.

ECMO and CS: Clinical Evidence

Editorial

Braz J Cardiovasc Surg | Rev Bras Cir Cardiovasc

There is one more thing to be done: ECMO!

Há algo mais a ser feito: ECMO!

Fernando Antoniali[1]

[1]Coordinator of the Pediatric Cardiac Surgery at PUC-Campinas and the Cardio Surgical Clinic ECMO group of Campinas linked to ELSO, Campinas, SP, Brazil.
E-mail: ferantoniali@uol.com.br

DOI: 10.5935/1678-9741.20150066

" – Unfortunately, it is not possible to get out of cardio-pulmonary bypass. We have already tried several times and it is not working. We will have to let the patient die! I will talk to the family..."

The last ELSO international report was on July 2015 and there were 69.114 ECMO patients in the registry with an overall survival of 59%[1].

In this post-cardiotomy ECMO group, the mean survival was 42.7%.

of the last ELSO report, the survival rates for cardiac ECMO are 41%, 51% and 42% for neonates, pediatrics and adults,

Changing these percentages for absolute numbers we have 38.616 patients that survived with ECMO.

And even though the number of Brazilians papers about ECMO is too small at this time – we can find just 25 in the MEDLINE with the terms "ECMO" and "Brazil" – there are over 8.000 international papers about ECMO in the same bibliographic database and less than 150 are experimental studies. And even more, among this huge number of scientific articles, 1.750 are reviews!

which has saved more than 38 thousands of lives is not good for our public health system (SUS) patients!

Really, there is one more thing to be done: ECMO!

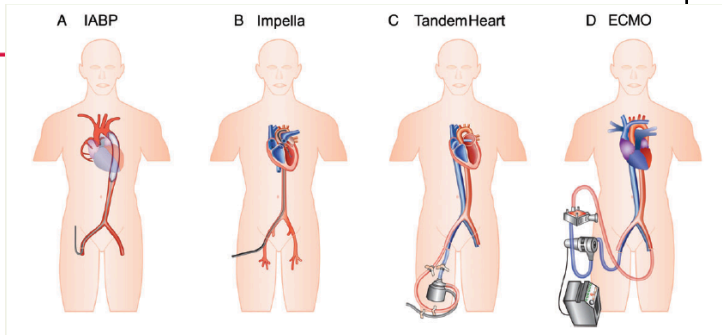
And so, we may use another approach for difficult situations that certainly we will need to face:

"- Unfortunately, we are not doing a good job trying to wean from CPB. I prefer not to overdo it with high levels of vasoactive drugs and bad ventilation. We had already planned and everyone is advised. Let's take the patient to the ICU on ECMO."

EUROPEAN SOCIETY OF CARDIOLOGY®

European Heart Journal (2014) **35**, 156–167
doi:10.1093/eurheartj/eht248

REVIEW



Novel devices

Mechanical circulatory support in cardiogenic shock

Karl Werdan[1]*, Stephan Gielen[1], Henning Ebelt[1], and Judith S. Hochman[2]

[1]Department of Internal Medicine III, Heart Center, Martin-Luther-University Halle-Wittenberg, University Hospital Halle/Saale, Ernst-Grube-Str. 40, Halle/Saale 06120, Germany; and
[2]Cardiovascular Clinical Research Center (CCRC), New York University Langone Medical Center, New York, NY, USA

Received 19 October 2012; revised 7 March 2013; accepted 10 June 2013; online publish-ahead-of-print 7 September 2013

Guidelines Recommendations

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Indication	Assist device	European Guidelines	
Cardiogenic shock	IABP	IIb/B	Intraaortic balloon pumping may be considered in patients with cardiogenic shock (Killip class IV)
	Left ventricular assist devices	IIb/C	LV assist devices may be considered for circulatory support in refractory shock in patients with cardiogenic shock (Killip class IV)

Ospedale Luigi Sacco
AZIENDA OSPEDALIERA - POLO UNIVERSITARIO

AMERICAN COLLEGE of CARDIOLOGY FOUNDATION

American Heart Association.

Guidelines Recommendations

Indication	Assist device	2013 American Guidelines	
Cardiogenic shock	IABP	IIa/B	Haemodynamic support for patients with cardiogenic shock after STEMI who do not quickly stabilize with pharmacological therapy
	Left ventricular assist devices	IIb/C	Alternative left ventricular (LV) assist devices for circulatory support may be considered in patients with refractory cardiogenic shock.

Österreichische Kardiologische Gesellschaft

DGK. Deutsche Gesellschaft für Kardiologie – Herz- und Kreislaufforschung e.V.

DIVI

Guidelines Recommendations

Indication	Assist device	German–Austrian Guidelines
Cardiogenic shock	IABP	⇑ In patients undergoing fibrinolysis
		⇔ In patients undergoing PCI
		⇑ In patients with mechanical complications
	Left ventricular assist devices	Routine use not recommended

Table 1. Guideline recommendations in cardiogenic shock [25,26]

Assist device	ACC/AHA/SCAI guidelines		ESC/EACTS guidelines	
IABP	Class IIa	A hemodynamic support device is recommended for patients with cardiogenic shock after STEMI who do not quickly stabilize with pharmacological therapy.	Class IIb	IABP insertion is recommended in patients with hemodynamic instability (particularly those in cardiogenic shock and with mechanical complications).
ECMO	No recommendation	No recommendation	No recommendation	ECMO implantation should be considered for temporary support in patients with acute heart failure with potential for functional recovery following revascularization.
TandemHeart®	Class IIb	Same as IABP	Class IIb	Routine use of percutaneous centrifugal pumps is not recommended.
Impella	Class IIb	Same as IABP	No recommendation	No recommendation

Abbreviations: ACC/AHA, American College of Cardiology/American Heart Association; EACTS, European Association for Cardio-Thoracic Surgery; ECMO, extracorporeal membrane oxygenation; ESC, European Society of Cardiology; IABP, intra-aortic balloon pump; SCAI, Society for Cardiovascular Angiography and Interventions; STEMI, ST segment elevation myocardial infarction.

The Task Force on the management of ST-segment elevation acute myocardial infarction of the European Society of Cardiology (ESC). ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation. *Eur Heart J* 2012;**33**:2569–2619.

O'Gara PT, Kushner FG, Ascheim DD, Casey DE Jr, Chung MK, de Lemos JA, Ettinger SM, Fang JC, Fesmire FM, Franklin BA, Granger CB, Krumholz HM, Linderbaum JA, Morrow DA, Newby LK, Ornato JP, Ou N, Radford MJ, Tamis-Holland JE, Tommaso CL, Tracy CM, Woo YJ, Zhao DX. 2013 ACCF/AHA guideline for the management of ST-elevation myocardial infarction: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Circulation.* 2013;**127**:e362–e425.

Werdan K, Ruß M, Buerke M, Delle-Karth G, Geppert A, Schöndube FA. Cardiogenic shock due to myocardial infarction: diagnosis, monitoring and treatment – a German-Austrian S3 Guideline. *Dtsch Arztebl Int* 2012;**109**:343–351.

il caso IABP...

ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation

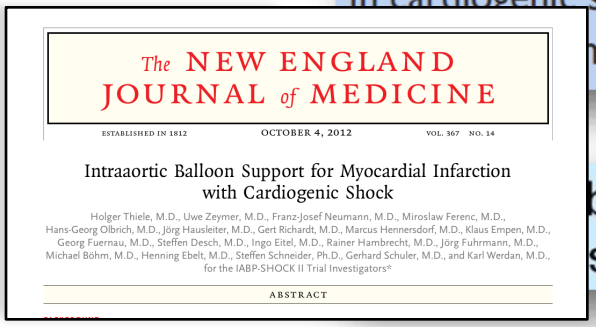
EUROPEAN SOCIETY OF CARDIOLOGY

2010

IABP insertion is recommended in patients with haemodynamic instability (particularly those in cardiogenic shock and with mplications).

I	C

2012



The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 OCTOBER 4, 2012 VOL. 367 NO. 14

Intraaortic Balloon Support for Myocardial Infarction with Cardiogenic Shock

Holger Thiele, M.D., Uwe Zeymer, M.D., Franz-Josef Neumann, M.D., Miroslaw Ferenc, M.D., Hans-Georg Olbrich, M.D., Jörg Hausleiter, M.D., Gert Richardt, M.D., Marcus Hennersdorf, M.D., Klaus Empen, M.D., Georg Fuernau, M.D., Steffen Desch, M.D., Ingo Eitel, M.D., Rainer Hambrecht, M.D., Jörg Fuhrmann, M.D., Michael Böhm, M.D., Henning Ebelt, M.D., Steffen Schneider, Ph.D., Gerhard Schuler, M.D., and Karl Werdan, M.D., for the IABP-SHOCK II Trial Investigators*

ABSTRACT

balloon pumping sidered.

IIb	B

2015

Intra-aortic balloon counterpulsation in acute myocardial infarction complicated by cardiogenic shock (IABP-SHOCK II): final 12 month results of a randomised, open-label trial

Holger Thiele, Uwe Zeymer, Franz-Josef Neumann, Miroslaw Ferenc, Hans-Georg Olbrich, Jörg Hausleiter, Antoinette de Waha, Gert Richardt, Marcus Hennersdorf, Klaus Empen, Georg Fuernau, Steffen Desch, Ingo Eitel, Rainer Hambrecht, Bernward Lauer, Michael Böhm, Henning Ebelt, Steffen Schneider, Karl Werdan, Gerhard Schuler*, on behalf of the Intraaortic Balloon Pump in cardiogenic shock II (IABP-SHOCK II) trial investigators†*

Summary

III	A

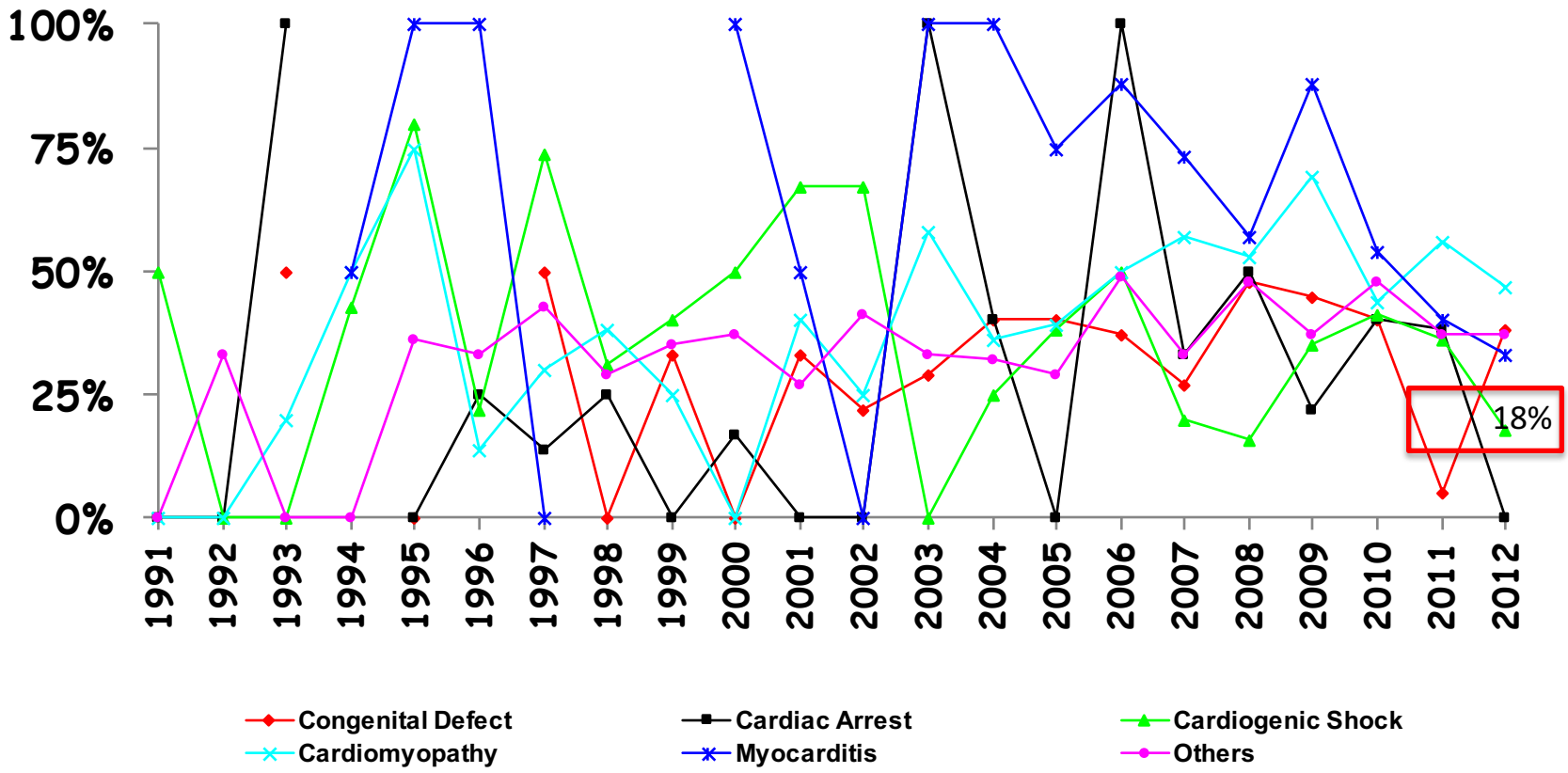
I	C

Heart Team.

Short-term mechanical circulatory support in ACS patients with cardiogenic shock may be considered.

IIb	C

Cardiac Survival by Diagnosis and Year
16 years old and over



ELSO Registry July 2012

ECLS Registry Report

International Summary

July, 2015

Extracorporeal Life Support Organization
2800 Plymouth Road
Building 300, Room 303
Ann Arbor, MI 48109

Overall Outcomes

	Total Patients	*Survived ECLS*		*Survived to DC or Transfer*	
Neonatal					
Respiratory	28,271	23,791	84%	20,978	74%
Cardiac	6,046	3,750	62%	2,497	41%
ECPR	1,188	766	64%	489	41%
Pediatric					
Respiratory	6,929	4,579	66%	3,979	57%
Cardiac	7,668	5,084	66%	3,878	51%
ECPR	2,583	1,432	55%	1,070	41%
Adult					
Respiratory	7,922	5,209	66%	4,576	58%
Cardiac	6,522	3,661	56%	2,708	42%
ECPR	1,985	791	40%	589	30%
Total	69,114	49,063	71%		

LIVELLO DI EVIDENZA C

Centers

Journal of Cardiac Failure Vol. 21 No. 6 2015

Consensus Statement

2015 SCAI/ACC/HFSA/STS Clinical Expert Consensus Statement on the Use of Percutaneous Mechanical Circulatory Support Devices in Cardiovascular Care (Endorsed by the American Heart Association, the Cardiological Society of India, and Sociedad Latino Americana de Cardiologia Intervencion; Affirmation of Value by the Canadian Association of Interventional Cardiology–Association Canadienne de Cardiologie d'intervention)*

CHARANJIT S. RIHAL, MD, FSCAI, FACC,[1] SRIHARI S. NAIDU, MD, FSCAI, FACC, FAHA,[2] MICHAEL M. GIVERTZ, MD, FACC,[3] WILSON Y. SZETO, MD,[4] JAMES A. BURKE, MD, PhD, FACC,[5] NAVIN K. KAPUR, MD,[6] MORTON KERN, MD, MSCAI, FACC,[7] KIRK N. GARRATT, MD, FSCAI, FACC,[8] JAMES A. GOLDSTEIN, MD, FSCAI, FACC,[9] VIVIAN DIMAS, MD,[10] AND THOMAS TU, MD,[11] FROM THE SOCIETY FOR CARDIOVASCULAR ANGIOGRAPHY AND INTERVENTIONS (SCAI), HEART FAILURE SOCIETY OF AMERICA (HFSA), SOCIETY FOR THORACIC SURGEONS (STS), AMERICAN HEART ASSOCIATION (AHA), AND AMERICAN COLLEGE OF CARDIOLOGY (ACC)

Rochester, Minnesota; Mineola and New York, New York; Boston, Massachusetts; Philadelphia and Allentown, Pennsylvania; Orange, California; Royal Oak, Michigan; Dallas, Texas; and Louisville, Kentucky

ABSTRACT

Although historically the intra-aortic balloon pump has been the only mechanical circulatory support device available to clinicians, a number of new devices have become commercially available and have entered clinical practice. These include axial flow pumps, such as Impella®; left atrial to femoral artery bypass pumps, specifically the TandemHeart; and new devices for institution of extracorporeal membrane oxygenation. These devices differ significantly in their hemodynamic effects, insertion, monitoring, and clinical applicability. This document reviews the physiologic impact on the circulation of these devices and their use in specific clinical situations. These situations include patients undergoing high-risk percutaneous coronary intervention, those presenting with cardiogenic shock, and acute decompensated heart failure. Specialized uses for right-sided support and in pediatric

From the [1]Division of Cardiovascular Diseases, Mayo Clinic, Rochester, Minnesota; [2]Division of Cardiology, Winthrop University Hospital, Mineola, New York; [3]Cardiovascular Division, Brigham and Women's Hospital, Boston, Massachusetts; [4]Department of Surgery, University of Pennsylvania, Philadelphia, Pennsylvania; [5]Division of Cardiology, Lehigh Valley Heart Specialists, Allentown, Pennsylvania; [6]Cardiology, Tufts Medical Center, Boston, Massachusetts; [7]Division of Cardiology, UCI Medical Center, Orange, California; [8]Department of Cardiac and Vascular Services, Heart and Vascular Institute of New York, Lenox Hill Hospital, New York, New York; [9]Division of Cardiology, Beaumont Heart Center Clinic, Royal Oak, Michigan; [10]Pediatric Cardiology, UT Southwestern, Dallas, Texas and [11]Louisville Cardiology Group, Interventional Cardiology, Louisville, Kentucky.

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Conflict of interest: See Appendices.

This article has been copublished in Catheterization Cardiovascular Interventions and Journal of the American College of Cardiology Catheterization Cardiovascular Interventions.

*The Canadian Association of Interventional Cardiology (CAIC) is approached by other guideline developers and asked to review and consider guidelines for endorsement. Guidelines developed by external organizations will be considered for affirmation of value. The CAIC may not agree with every recommendation in such a document, but overall considers the document to be of educational value to its members.

1071-9164/$ - see front matter

http://dx.doi.org/10.1016/j.cardfail.2015.03.002

① i sistemi di supporto meccanico al circolo (MCS) forniscono un supporto emodinamico superiore rispetto alla terapia farmacologica

② impianto precoce di un appropriato sistema MCS nei casi che falliscono la stabilizzazione o che mostrano solo transitorio miglioramento

③ nei casi di PCI ad elevata complessitià (HR-PCI): interventi su multivaso, IVA, last patent conduit, se non candidabili a CCH, FE gravemente depressa o in EPA

④ in caso di shock cardiogeno refrattario soprattutto se complicato da deterioramento degli scambi respiratori

⑤ nei quadri di Insufficienza cardiaca acuta (Decompensated Heart failure) refrattaria con criteri di candidabilità a VADs *"bridge to bridge",* o in cui un rapido recupero sia prospettabile (miocardite, cardiomiopatia peri-partum) *"bridge to recovery"*

Journal of Cardiac Failure Vol. 21 No. 6 2015

2013 ACCF/AHA Guideline for the Management of STEMI

- IIA Recommendation (*Level of Evidence: B*)

"The use of IABP can be useful for patients with cardiogenic shock after STEMI who do not quickly stabilize with pharmacological therapy"

O'Gara PT, et al. *Circulation* 2013;127:e362-e425.

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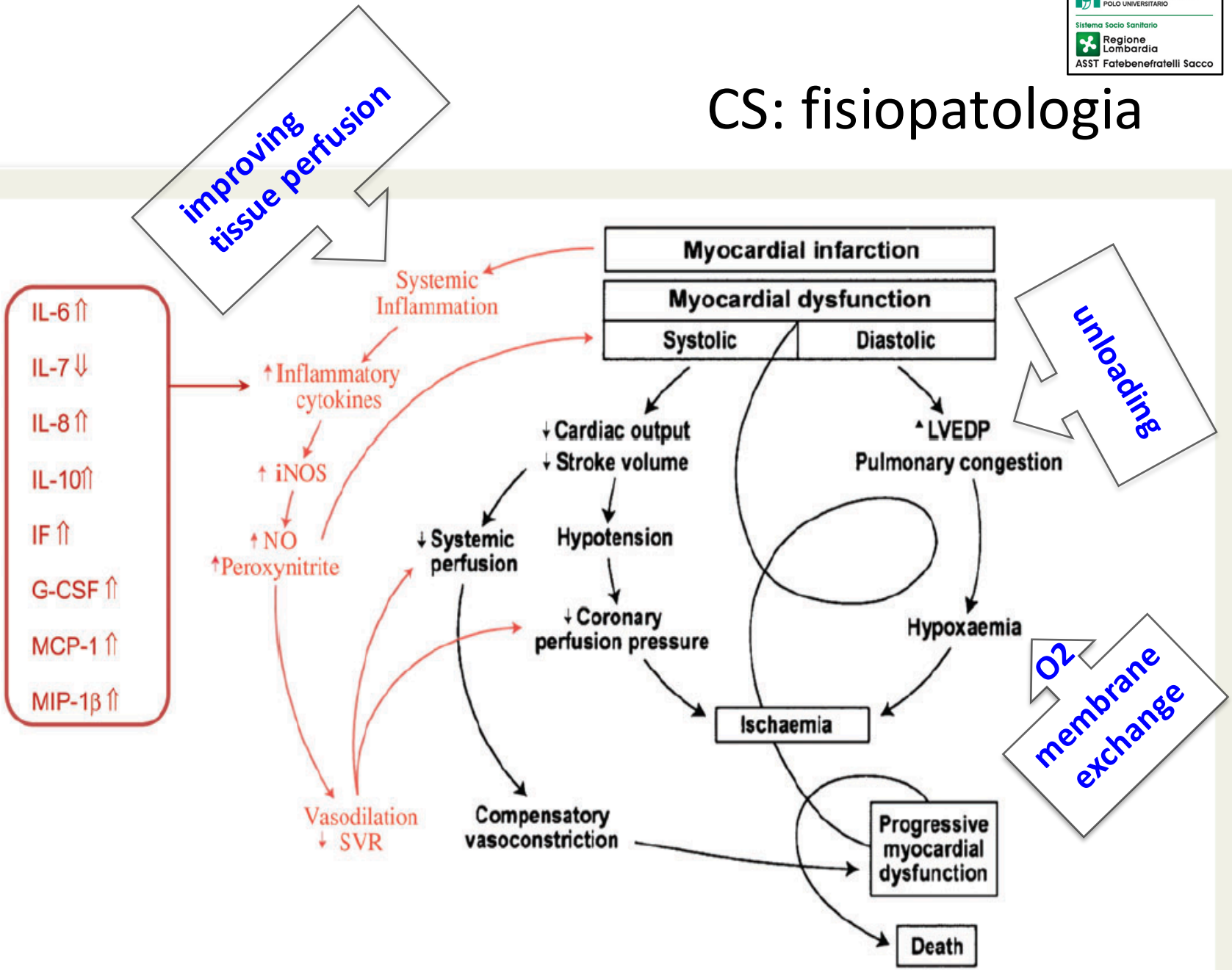
American Heart Association.

ECMO

- Provides cardiopulmonary support for patients whose heart and lungs can no longer provide adequate physiologic support
  - veno-veno for oxygenation only
  - veno-arterial for oxygenation and circulatory support
- In the setting of interventional cardiology and PCI not used as a first-line agent
- When used, it is with another device such as Impella® or IABP to help reduce afterload

Rihal CS, et al. *J Am Coll Cardiol.* 2015;65:e7-e26.

CS: fisiopatologia

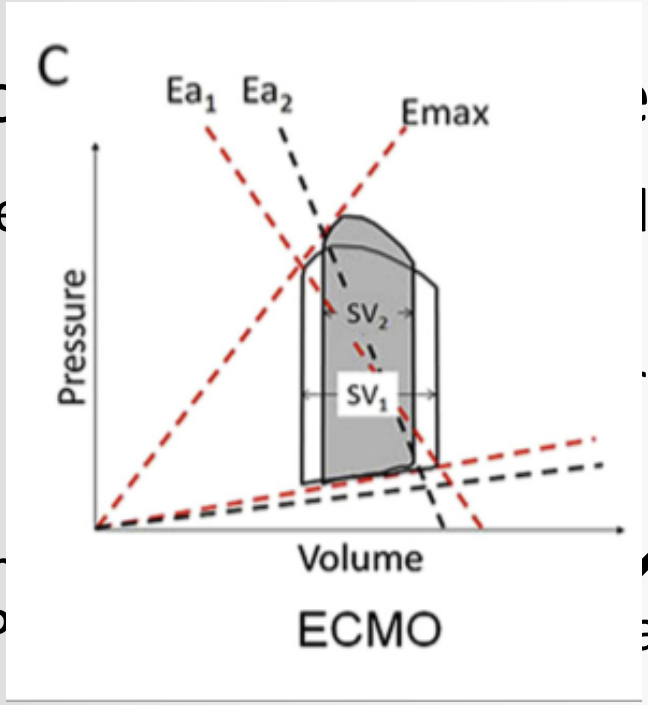


cosa si intende per loading ventricolare?

- in condizioni normali, le fibre miocardiche raggiungono, alla fine della diastole, una lunghezza predeterminata che è la risultante tra pressione di riempimento dall'Atrio sx e compliance del Ventricolo sx
- PRELOAD: lunghezza a fine diastole raggiunta dalle fibre miocardiche all'equilibrio tra pressioni di riempimento e compliance
- normale: PRELOAD - Frank-Starling - performance ventricolare
- patologico: dilatazione progressiva del VS - ⇧Pressioni di fine diastole – rimodellamento – insufficienza sisto-diastolica

cosa si intende per unloading ventricolare?

- ECMO non dec … nte il VS:
  - ECMO v-a re … ling ↑post-carico
  - una parte d … colazione bronchiale
  - mancata ap …
  - accumulo ir … ↑LVEDV → ↑LVEDP → EDEMA P … ascolare con emorragia polmonare

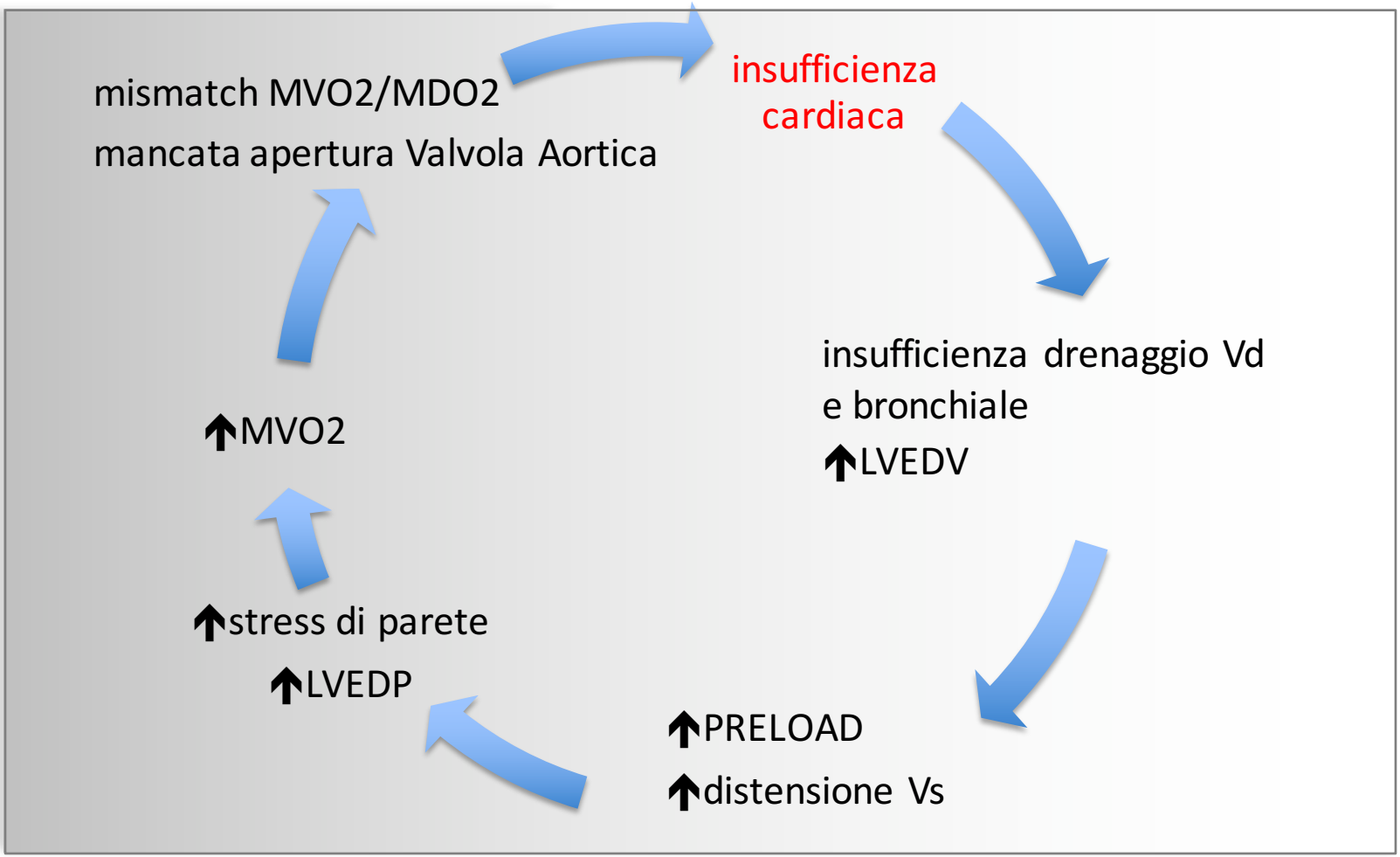


- ECMO fornisce:
  - drenaggio venoso dall'Atrio dx
  - ↓ LVEDV-LVEDP, diametri cavitari

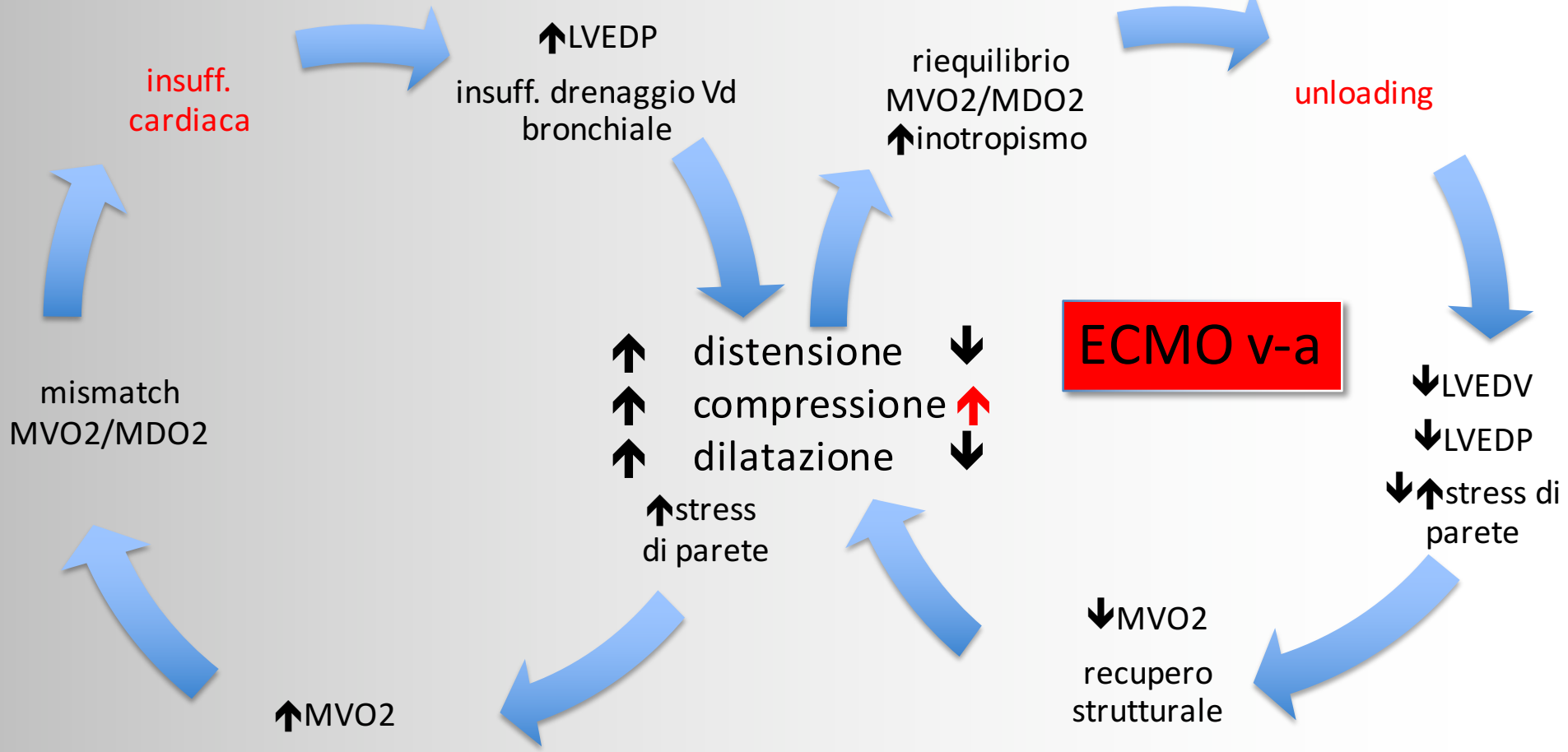
drenaggio ventricolare adeguato

cosa si intende per unloading ventricolare?

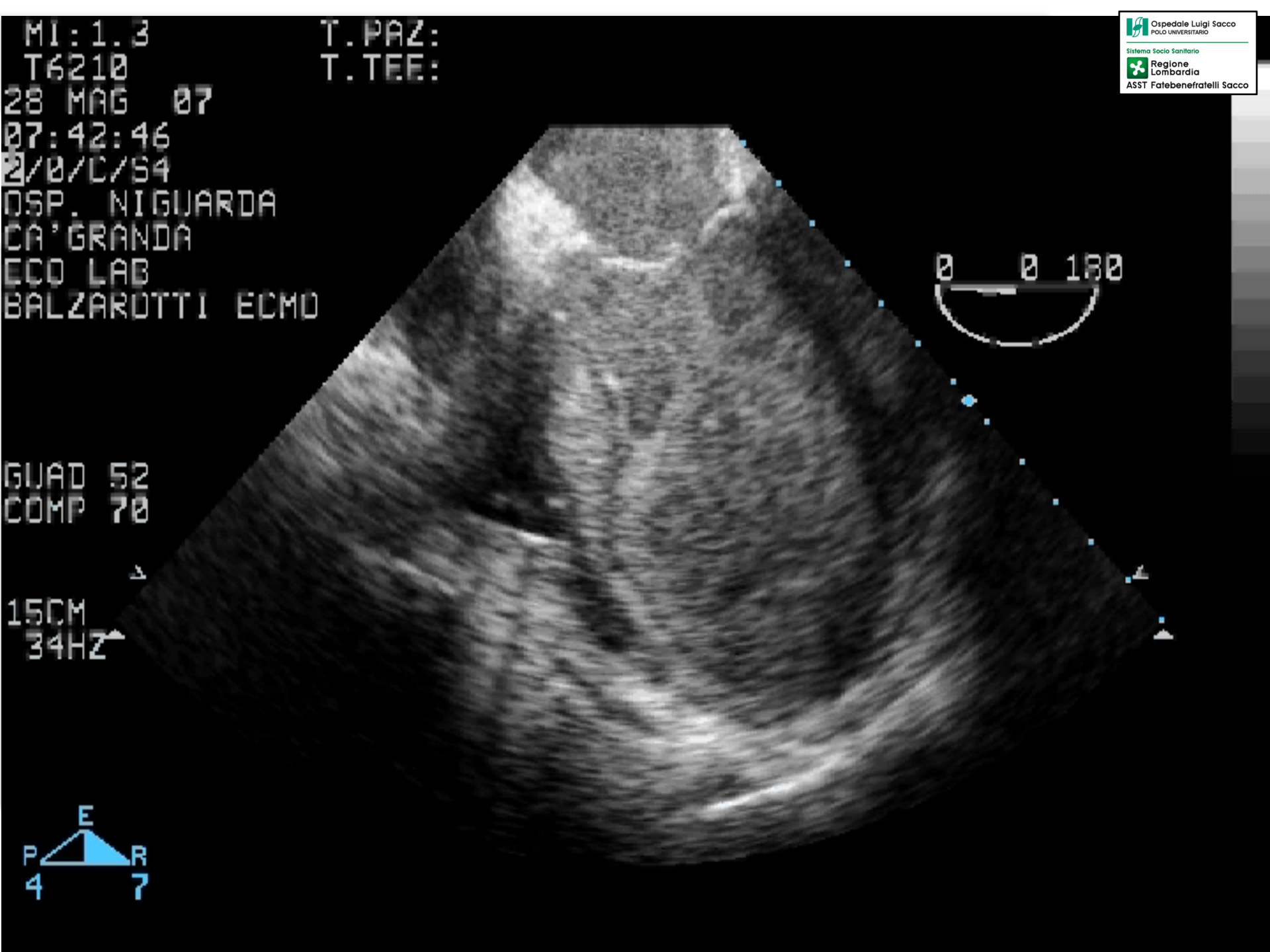
precarico Vsx = lunghezza a fine diastole raggiunta dalle fibre miocardiche all'equilibrio tra pressioni di riempimento e compliance



cosa si intende per unloading ventricolare in ECMO v-a?



Kapur NK, Paruchuri V, Urbano-Morales JA, Mackey EE, Daly GH, Qiao X, Pandian N, Perides G, Karas RH. Mechanically unloading the left ventricle before coronary reperfusion reduces left ventricular wall stress and myocardial infarct size. Circulation 2013;128:328–36.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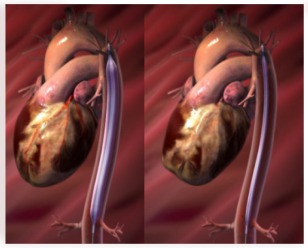
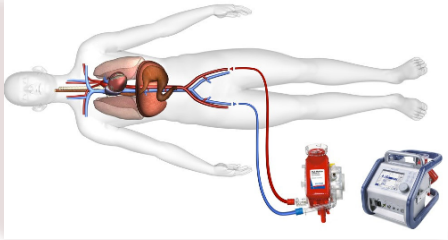
Regione Lombardia
ASST Fatebenefratelli Sacco

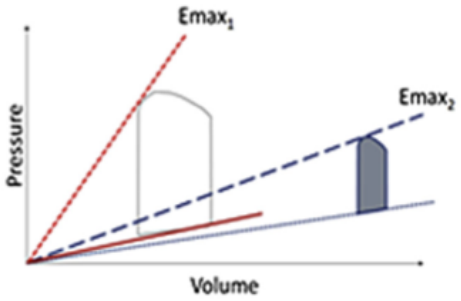
IAPB + ECMO v-a





	IABP	ECMO
Afterload	Reduced	Increased
LV stroke volume	Slight increase	Reduced
Coronary perfusion	Slight increase	Unknown
LV pre-load	Slightly reduced	Reduced
PCW pressure	Slightly reduced	Reduced
Peripheral tissue perfusion	No significant increase	Improved

C Cardiogenic Shock



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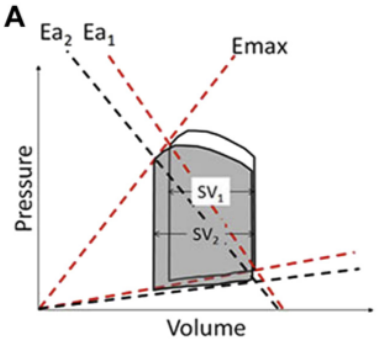
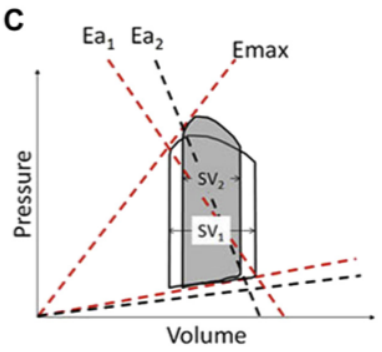


IABP

C



ECMO

The Impact of Intraaortic Balloon Counterpulsation on Bypass Graft Flow in Patients with Peripheral ECMO

Navid Madershahian, M.D., Oliver J. Liakopoulos, M.D., Jens Wippermann, M.D., Shahriar Salehi-Gilani, M.D., Thorsten Wittwer, M.D., Yeong-Hoon Choi, M.D., Hamid Naraghi, M.D., and Thorsten Wahlers, M.D.

Department of Cardiothoracic Surgery, Cologne University Heart Centre, Cologne, Germany

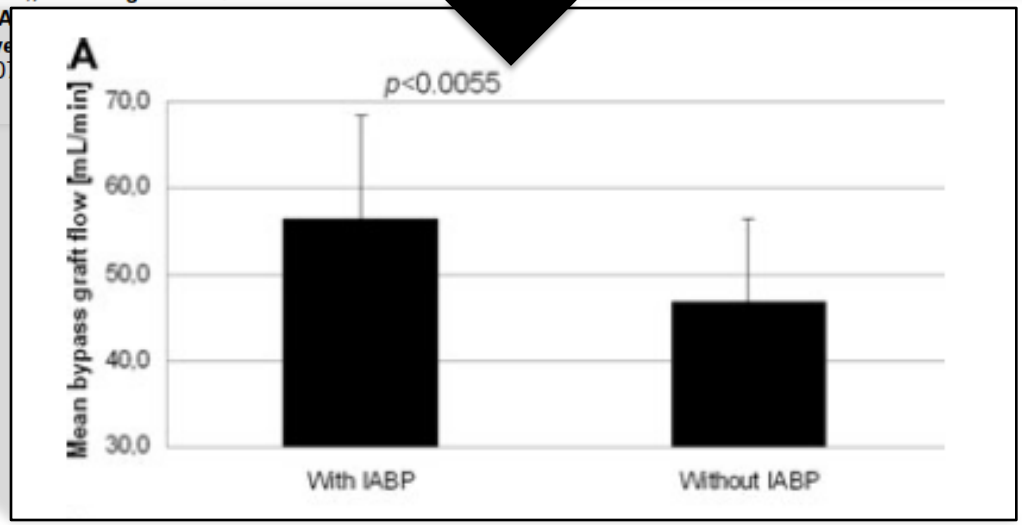
ABSTRACT ***Objective:*** **Numerous reports have been performed to investigate the hemodynamic ef-**
fects of intraaortic balloon p
genation (ECMO), but studi
tant use of IABP and ECM
ditional IABP support on th
with nonpulsatile femoral ve
patients (mean age = 66.3
25.0 ± 3.0%) requiring mecha

Implementation of intraaortic balloon counterpulsation during ECMO support resulted in a significant increase of bypass grafts flow from 46.8 ± 9.6 mL/min to 56.4 ± 12.1 mL/min ($p < 0.005$) corresponding to a 17% increase (Fig. 1A).

TABLE 1
Patient Characteristics

Number of Patients (n)	6
Male/female	5/1
Age (years)	66.3 ± 2.1
Sinus rhythm	100%
Coronary lesions	All patients with 3 VD
Preop. LVEF	25.0 ± 3.0%
CPB time (min)	111.5 ± 12.3
Aortic cross-clamp time (min)	49.7 ± 4.5
Heart rate (bpm)	82.4 ± 12.8
Total number of pedicled LITA	3
Total number of venous bypass grafts	17
ECMO blood flow (L/min)	4.8 ± 0.1
Time on ECMO (hours)	141.3 ± 21.9
Death	2 (1 male, 1 female)

3VD = triple vessel disease; CPB = cardiopulmonary bypass; ECMO = extracorporeal membrane oxygenation; IABP = intraaortic balloon pumping; LITA = left internal thoracic artery; LVEF = left ventricular ejection fraction.



Originalien

Med Klin Intensivmed Notfmed 2015 · 110:210–216
DOI 10.1007/s00063-014-0408-6
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Angenommen: 4. August 2014
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T. Schroeter · M. Vollroth · M. Höbartner · M. Sauer · M. Mende · F.W. Mohr · M. Misfeld
Herzzentrum Leipzig, Universität Leipzig, Leipzig

Einfluss von ECMO und IABP auf die Koronardurchblutung

Sinnvolle Kombination oder Ressourcenverschwendung?

Alien Origin

Medical Clinic - Intensive Care and Emergency Medicine

April 2015, Volume 110, Issue 3, pp 210-217

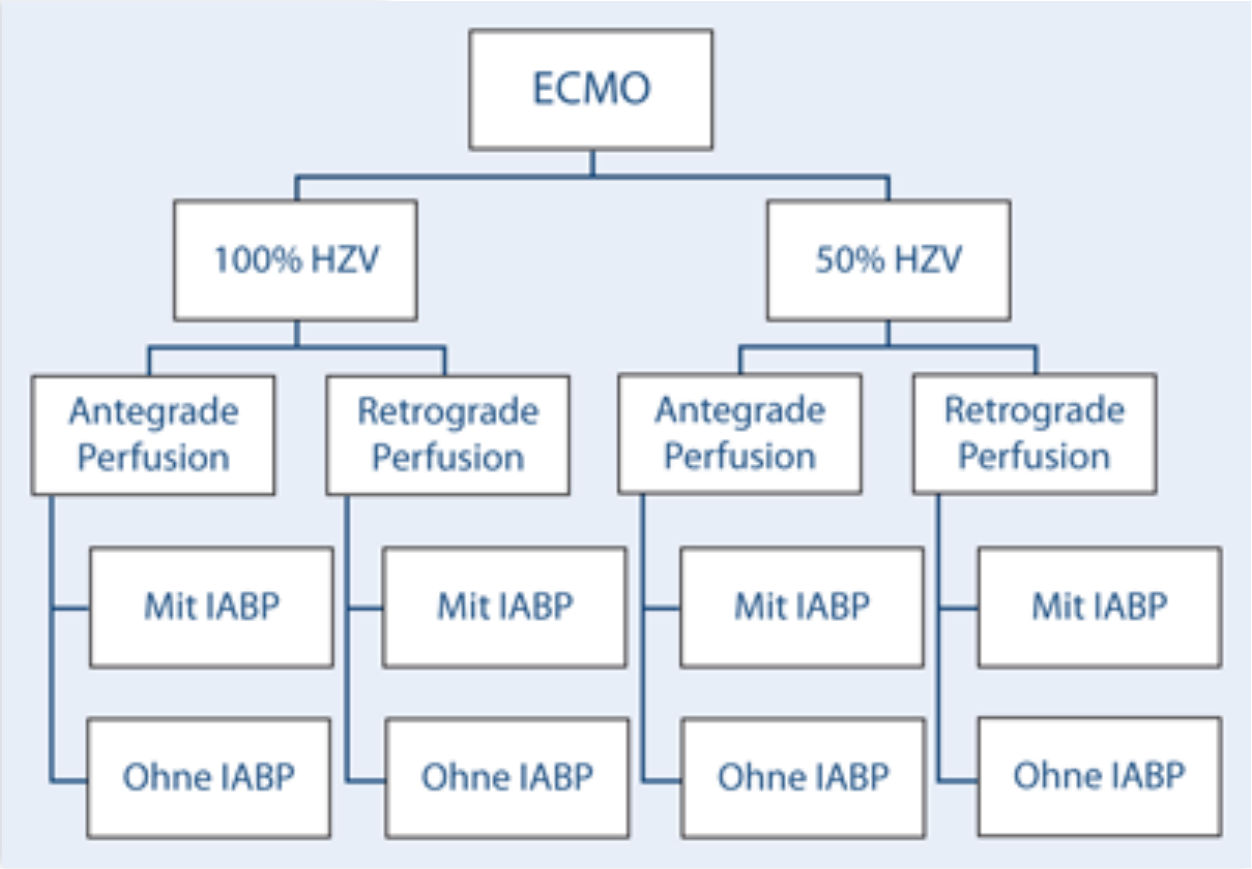
First line: 30 August 2014

Influence of ECMO and IABP on coronary blood flow

Sensible combination or a waste of resources?

T. Schroeter , M. Full Roth, M. Höbartner, M. Acidic, M. Mende, FW Mohr, M. Misfeld

10.1007 / s00063-014-0408-6


ECMO
100% HZV
50% HZV
Antegrade Perfusion
Retrograde Perfusion
Antegrade Perfusion
Retrograde Perfusion
Mit IABP
Mit IABP
Mit IABP
Mit IABP
Ohne IABP
Ohne IABP
Ohne IABP
Ohne IABP

perfusione	IABP	ECMO sostegno %	IVA PAm mmHg ± SD	Atrio sx PA mmHg ± SD	Sat O2 Seno Coronarico	Seno Coronarico
anterograda	no	100	48.6±1.4	6.9±0.2	33.0±8.8	2.3±1.1
anterograda	si	100	59.8±0.8	7.3±0.1	38.4±13.4	2.4±0.9
retrograda	no	100	58.9±0.9	7.0±0.2	29.2±10.6	2.7±0.9
retrograda	si	100	52.9±1.1	6.9±0.3	24.6±6.3	2.3±0.4
anterograda	no	50	51.5±0.7	7.9±0.2	26.9±10.8	2.7±1.1
anterograda	si	50	57.3±1.2	8.2±0.2	26.4±5.8	2.8±1.3
retrograda	no	50	54.1±2	8.5±0.1	25.1±12.6	2.8±1.4
retrograda	si	50	48.6±0.3	8.1±0.2	24.3±7.6	3.2±2.0

+23.4%

-11.3%

+18.8%

-13.1%

-15.8%

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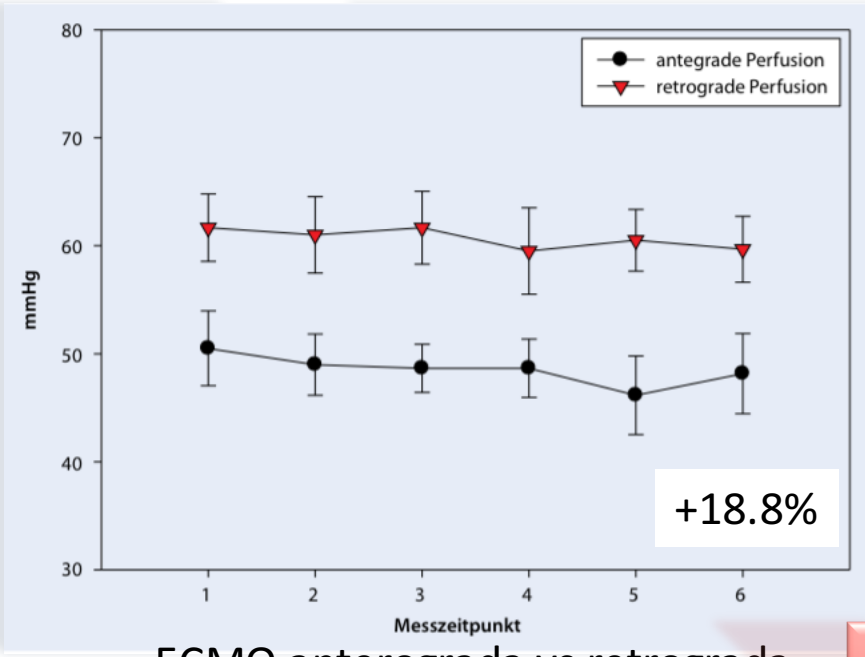
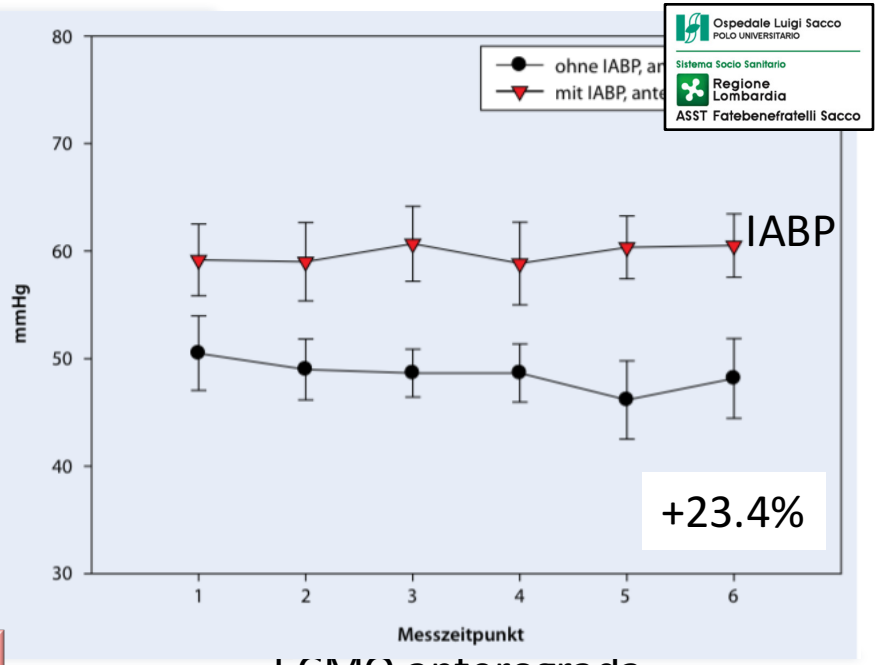
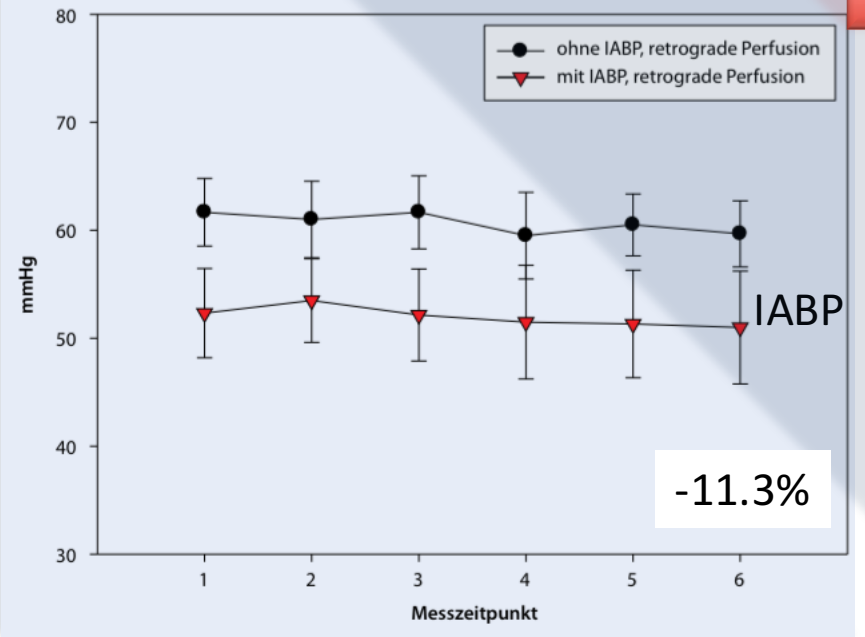


ECMO anterograda vs retrograda

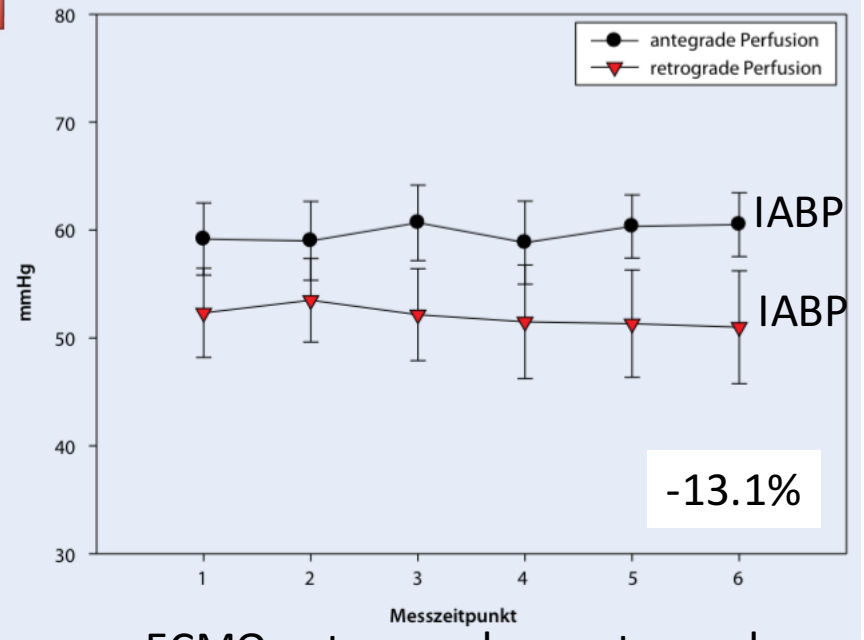


ECMO anterograda

IVA (PAm)



ECMO retrograda



ECMO anterograda vs retrograda

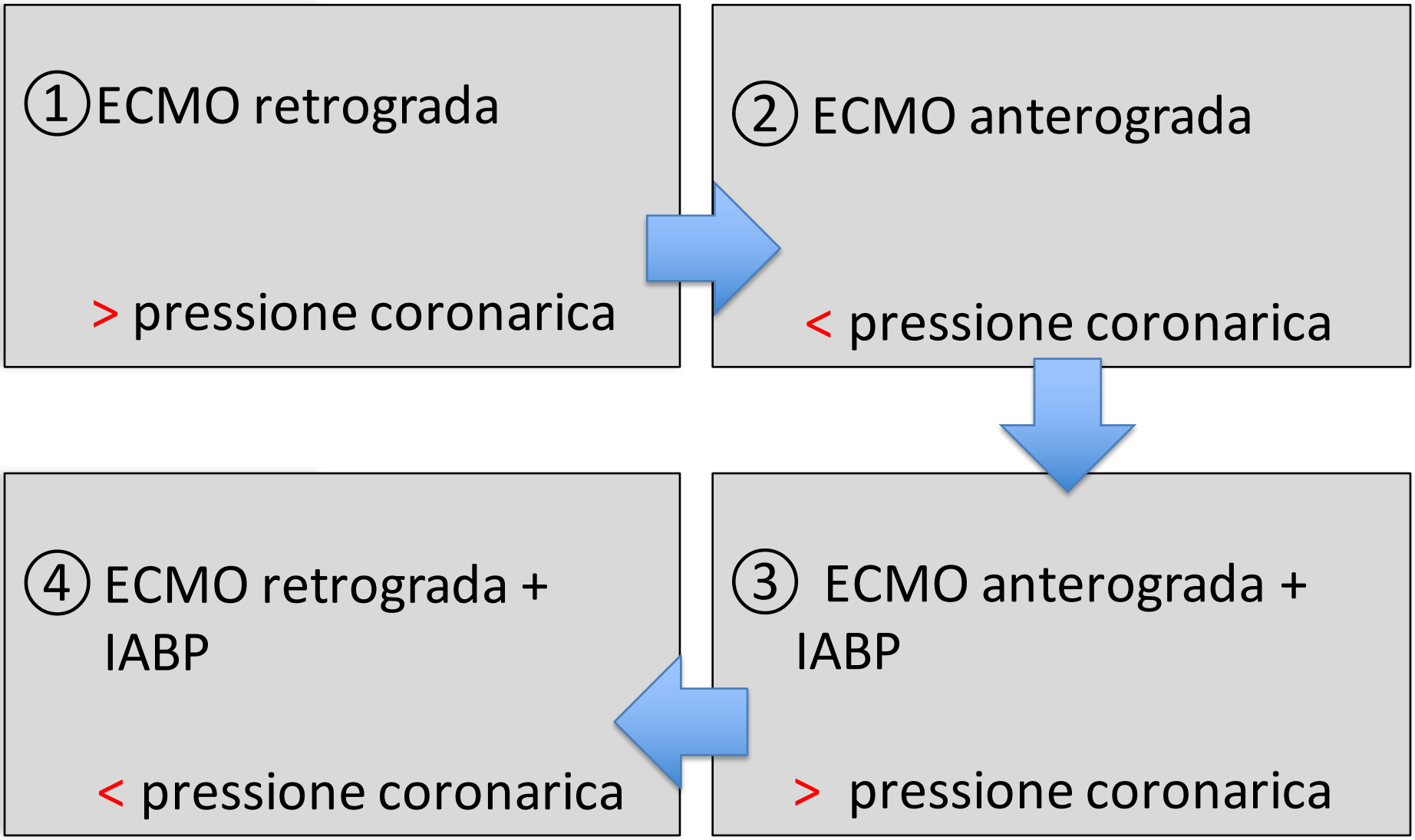

① ECMO retrograda
> pressione coronarica
② ECMO anterograda
< pressione coronarica
③ ECMO anterograda + IABP
> pressione coronarica
④ ECMO retrograda + IABP
< pressione coronarica

Table 7 The Incidence of Various Complications in Adults [65,66,68,70,72,89,90,91].

Complication	Incidence (%)
Blood clots (oxygenator, pump, tubing, haemofilter)	0.13–22
Bleeding (surgical site, cannulation site, gastrointestinal, intracranial, tracheostomy, haemolysis, DIC)	5.3–79
Pump failure	4.7–30
Oxygenator failure	21–27
Neurologic and musculoskeletal complications (intracranial bleed, stroke, seizure, encephalopathy)	10–33
Limb ischaemia	13–25
Infection	17–49
Renal failure	30–58
Multiple organ dysfunction syndrome	10
Problems during cannulation	0.8–8
Hyperbilirubinaemia	27

Heart, Lung and Circulation (2014) 23, 10–23

Take Home Messages

Ospedale Luigi Sacco
POLO UNIVERSITARIO
Sistema Socio Sanitario
Regione Lombardia
ASST Fatebenefratelli Sacco

l'EBM attuale non supporta l'entusiasmo del Prof. Antoniali….

- ✓ no RCTs in corso per ECMO
- ✓ RCTs per IABP supportano livelli di evidenza bassi
- ✓ l'associazione ECMO + IABP solleva questioni aperte
- ✓ i sistemi di assistenza di circolo sono accompagnati da tassi di effetti collaterali ancora consistenti

Tuttavia…per quanto i dati sperimentali e su popolazioni sono al momento non supportati da solidità statistica, da essi emerge un qualcosa che ancora aspetta una sua definitiva

perciò e nonostante tutto…

"let's take the patient to the ICU on ECMO!"

Sistema Sanitario Regione Lombardia

Ospedale Luigi Sacco
AZIENDA OSPEDALIERA - POLO UNIVERSITARIO

ECMO and ACC: Clinical Evidence

Annales Françaises d'Anesthésie et de Réanimation 28 (2009) 187–190

INFORMATION PROFESSIONNELLE

Guidelines for indications for the use of extracorporeal life support in refractory cardiac arrest☆

Conseil français de réanimation cardiopulmonaire (CFRC)
Société française d'anesthésie et de réanimation (Sfar)
Société française de cardiologie (SFC)
Société française de chirurgie thoracique et cardio-vasculaire (SFCTCV)
Société française de médecine d'urgence (SFMU)
Société française de pédiatrie (SFP)–Groupe francophone de réanimation et d'urgence pédiatriques (GFRUP)
Société française de perfusion (SOFRAPERF)
Société de réanimation de langue française (SRLF)

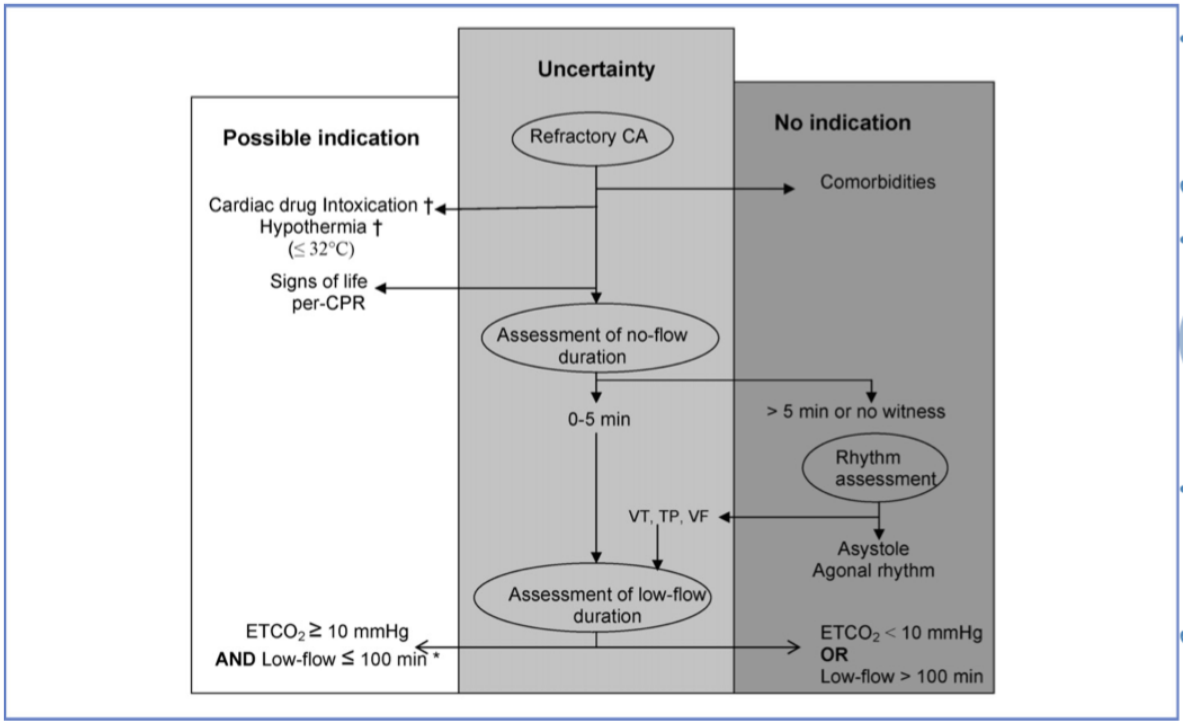


Fig. 1. A suggested algorithm to decide whether extracorporeal life support (ECLS) could be used in treating refractory cardiac arrest (CA). CPR: cardiopulmonary resuscitation; VT: ventricular tachycardia; VF: ventricular fibrillation; TP: torsades de pointes; $ETCO_2$: end-tidal CO_2 (measured 20 min after the onset of medical CPR). *: CPR duration > 100 min could be accepted in case of poisoning with cardiac drugs. †: indications accepted by ILCOR [11]. Comorbidities are those which should contraindicate invasive care (admission into ICU, major surgery, coronary angioplasty for example). The low-flow duration encompasses basic CPR (witness and/or paramedics) and medical CPR.