Clinical case

Prof. Jean-Louis TEBOUL

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France

Conflicts of interest

- Member of the Medical Advisory Board of **Getinge**
- Lectures for **Edwards LifeSciences**
- Lectures for **Masimo**

Mr R., **68 *y.o.***

- **Medical history:**
  - Chronic hypertension
  - COPD
- **Cough** and **fever** for three days,
- Increasing **dyspnea** since the last day

at the ER (H_0)

- mental confusion
- mottling
- crackles (right lung >left lung)
- fever 39° C

- RR = **40** /min
- HR = **104** /min
- AP = **69**/**34** (45) mmHg
- SpO_2 = **90**% (O_2 10L/min)

You decide to **intubate** the patient and infuse **500 mL crystalloids**.

Do you initiate **norepinephrine** at this stage?

Q_1

1. **Yes**
2. **No**
3. **I don't know**

at the ER (H_0)

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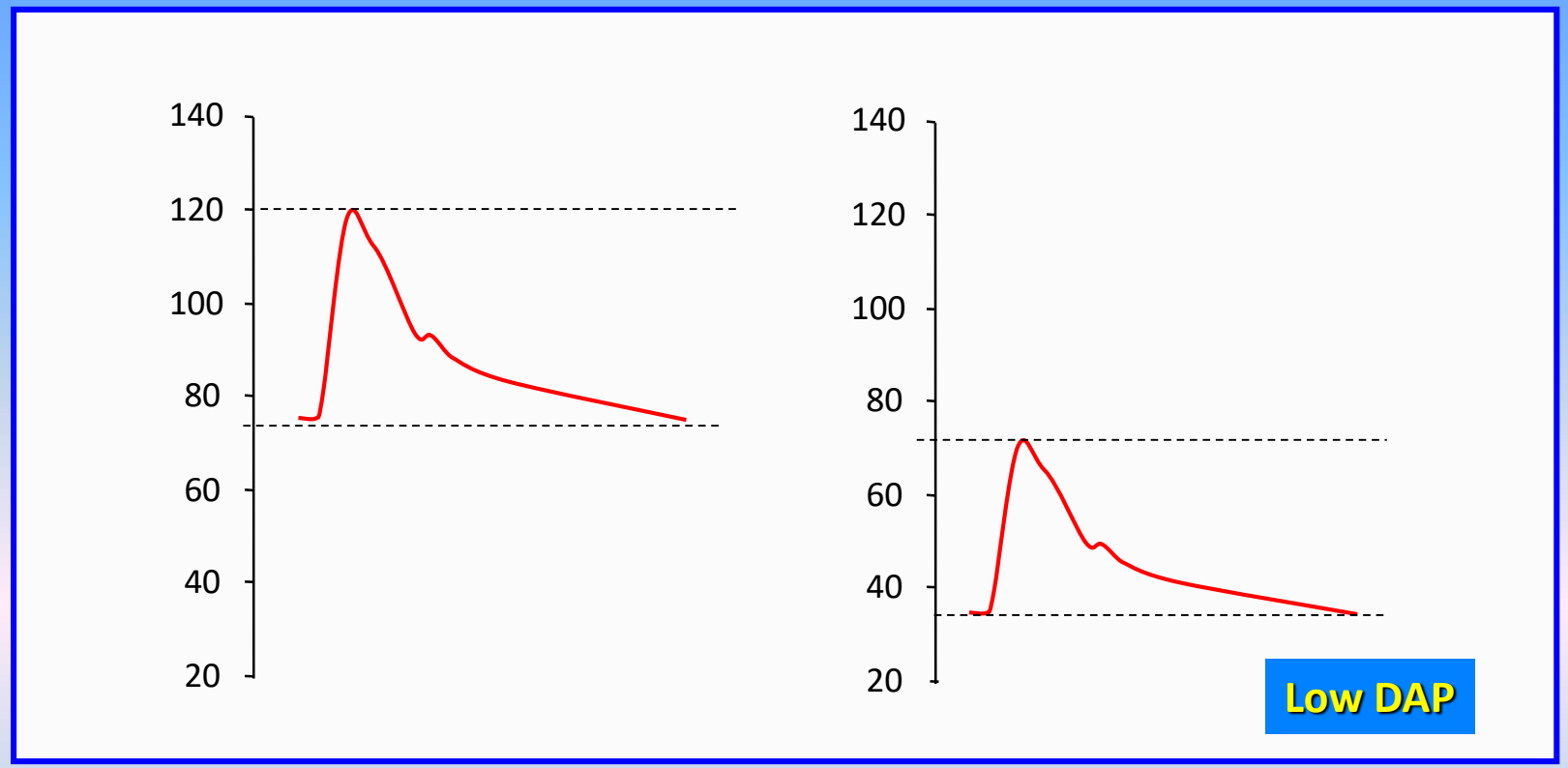


- suggests a **decreased** arterial **tone**
- suggests the **septic** origin of shock
- incites to administer a **vasopressor**

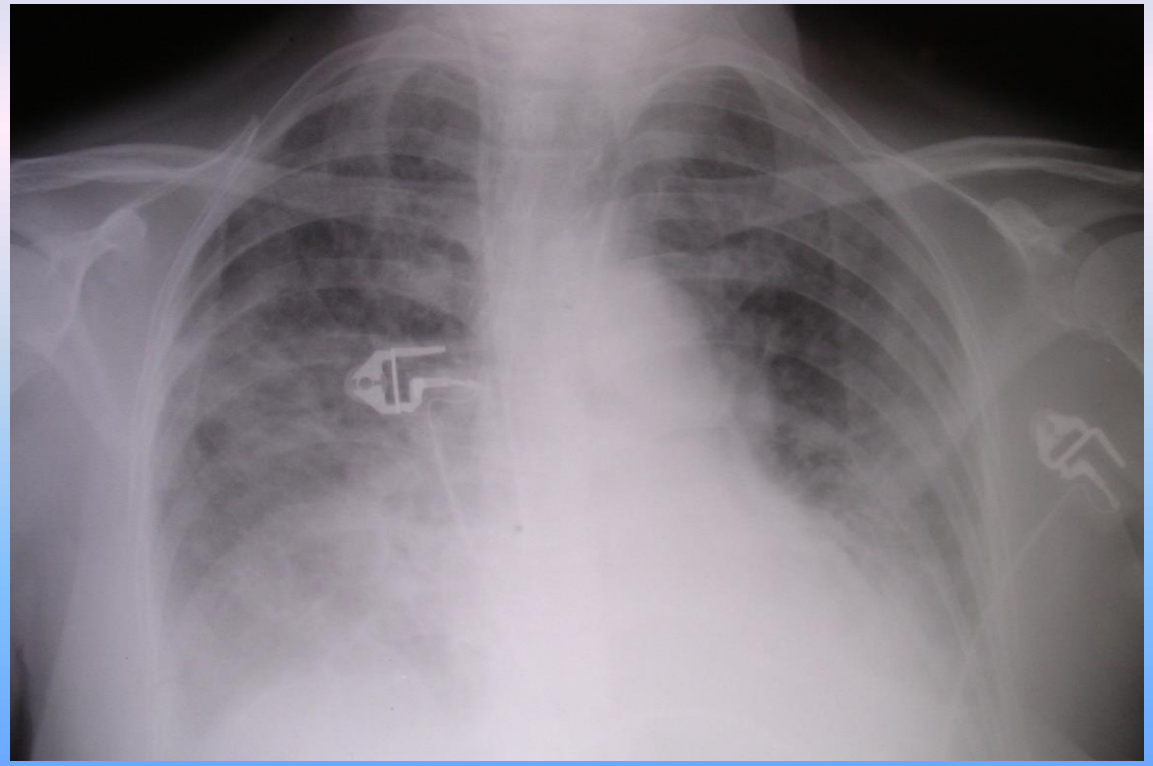
Take-home messages

1- During **septic** shock, **norepinephrine** should be initiated **early** when arterial **tone** is assumed to be **low**, e.g. when **DAP** is **low** (< 40 mmHg)

at the ER (H_0)

Lactate	**4.2** mmol/L
Urea	**23** mmol/L
Creat.	**210** µmol/L
CRP	**210** mg/L

(before intubation)	
pH	**7.25**
PaO_2	**78** mmHg
$PaCO_2$	**42** mmHg
HCO_3^-	**19** mmol/L



30 min after intubation, in the ICU

HR	**103** /min
AP	**80/38** (**52**) mmHg
CVP	**10** mmHg
PPV	**7**%

Lactate	**4.1** mmol/L

crystalloids	**750** mL
NE	**0.25** µg/kg/min
Propofol	**150** mg/h
Ceftriaxone + Levofloxacin	

RR	**18** /min
TV	**400** mL (6 mL/kg)
Pplat	**25** cmH_2O
PEEP	**10** cmH_2O
P/F	**190**

What do you do in terms of **treatment**?

Q_2

1. **Infuse fluids**, first
2. **Increase NE dose**, first
3. **Do both** at the same time
4. **Dobutamine**
5. **Nothing else**

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What do you use for initial **hemodynamic assessment**?

Q_3

1. **Echocardiography**
2. **Uncalibrated CO monitoring**
3. **Transpulmonary thermodilution**
4. **PAC**
5. **Nothing more** than **AP monitoring**

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Take-home messages

1- During **septic** shock, **norepinephrine** should be initiated **early** when arterial **tone** is assumed to be **low**, e.g. when **DAP** is **low** (< 40 mmHg)

2- **Echocardiography** is the **preferred** modality to **initially evaluate** the type of **shock** as opposed to more invasive technologies

Intensive Care Med (2014) 40:1795–1815

CONFERENCE REPORTS AND EXPERT PANEL

Maurizio Cecconi
Daniel De Backer
Massimo Antonelli
Richard Beale
Jan Bakker
Christoph Hofer
Roman Jaeschke
Alexandre Mebazaa
Michael R. Pinsky
Jean Louis Teboul
Jean Louis Vincent
Andrew Rhodes

Consensus on circulatory shock and hemodynamic monitoring. Task force of the European Society of Intensive Care Medicine

Intensive Care Med (2016) 42:1350–1359

CONFERENCE REPORTS AND EXPERT PANEL

CrossMark

Less invasive hemodynamic monitoring in critically ill patients

Jean-Louis Teboul[1*], Bernd Saugel[2], Maurizio Cecconi[3], Daniel De Backer[4], Christoph K. Hofer[5], Xavier Monnet[1], Azriel Perel[6], Michael R. Pinsky[7], Daniel A. Reuter[2], Andrew Rhodes[3], Pierre Squara[8], Jean-Louis Vincent[9] and Thomas W. Scheeren[10]

Transthoracic echocardiography	
LV size	normal
LVEF	70%
RV function	normal

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What do you think about **organ perfusion pressure**?

Q_4

1. **Sufficient**
2. **Insufficient**
3. **I don't know**

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Why **insufficient**?

Q_5

1. **History of chronic hypertension**
2. **High CVP**
3. **Both**
4. **I don't know**

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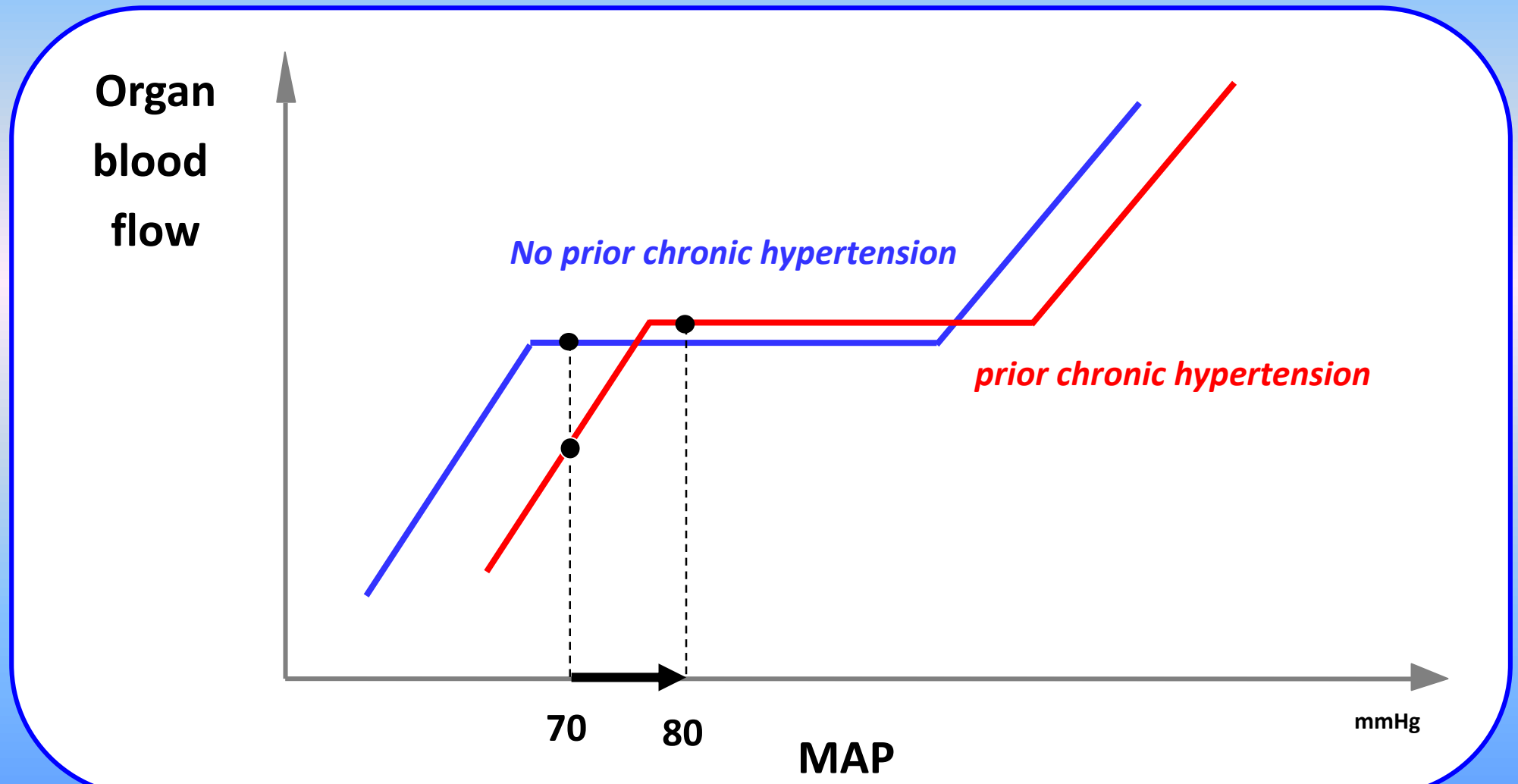
Autoregulation of Brain Circulation in Severe Arterial Hypertension

S. STRANDGAARD, J. OLESEN, E. SKINHØJ, N. A. LASSEN

British Medical Journal, 1973, 1, 507–510



The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 APRIL 24, 2014 VOL. 370 NO. 17

80-85 mmHg

65-70 mmHg

High versus Low Blood-Pressure Target in Patients with Septic Shock

Pierre Asfar, M.D., Ph.D., Ferhat Meziani, M.D., Ph.D., Jean-François Hamel, M.D., Fabien Grelon, M.D.,

Alain Mercat, M.D., Ph.D., Jean-Louis Teboul, M.D., Ph.D., and Peter Radermacher, M.D., Ph.D.,
for the SEPSISPAM Investigators*

Benefits in terms of **kidney function** with a **high MAP** target in patients with **chronic hypertension**

388 pts

388 pts

Low mean perfusion pressure is a risk factor for progression of acute kidney injury in critically ill patients – A retrospective analysis

Marlies Ostermann[1*], Anna Hall[2] and Siobhan Crichton[3]

BMC Nephrology (2017) 18:151

Mean perfusion pressure (MPP = MAP - CVP) but **not MAP** was an independent factor associated with **AKI progression**

A value of **MPP** of **60 mmHg** was found as a cutoff

Take-home messages

1- During **septic** shock, **norepinephrine** should be initiated **early** when arterial **tone** is assumed to be **low**, e.g. when **DAP** is **low** (< 40 mmHg)

2- **Echocardiography** is the **preferred** modality to **initially evaluate** the type of **shock** as opposed to more invasive technologies

3- The **organ perfusion pressure** should be estimated from the upstream organ pressure (**MAP**) and the downstream organ pressure (most often **CVP**) and **not from MAP alone**

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$ScvO_2$	**53**%
Hb	**11** g/dL

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Q_6

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2. **Increase NE dose**, first
3. **Dobutamine**
4. **Nothing else**
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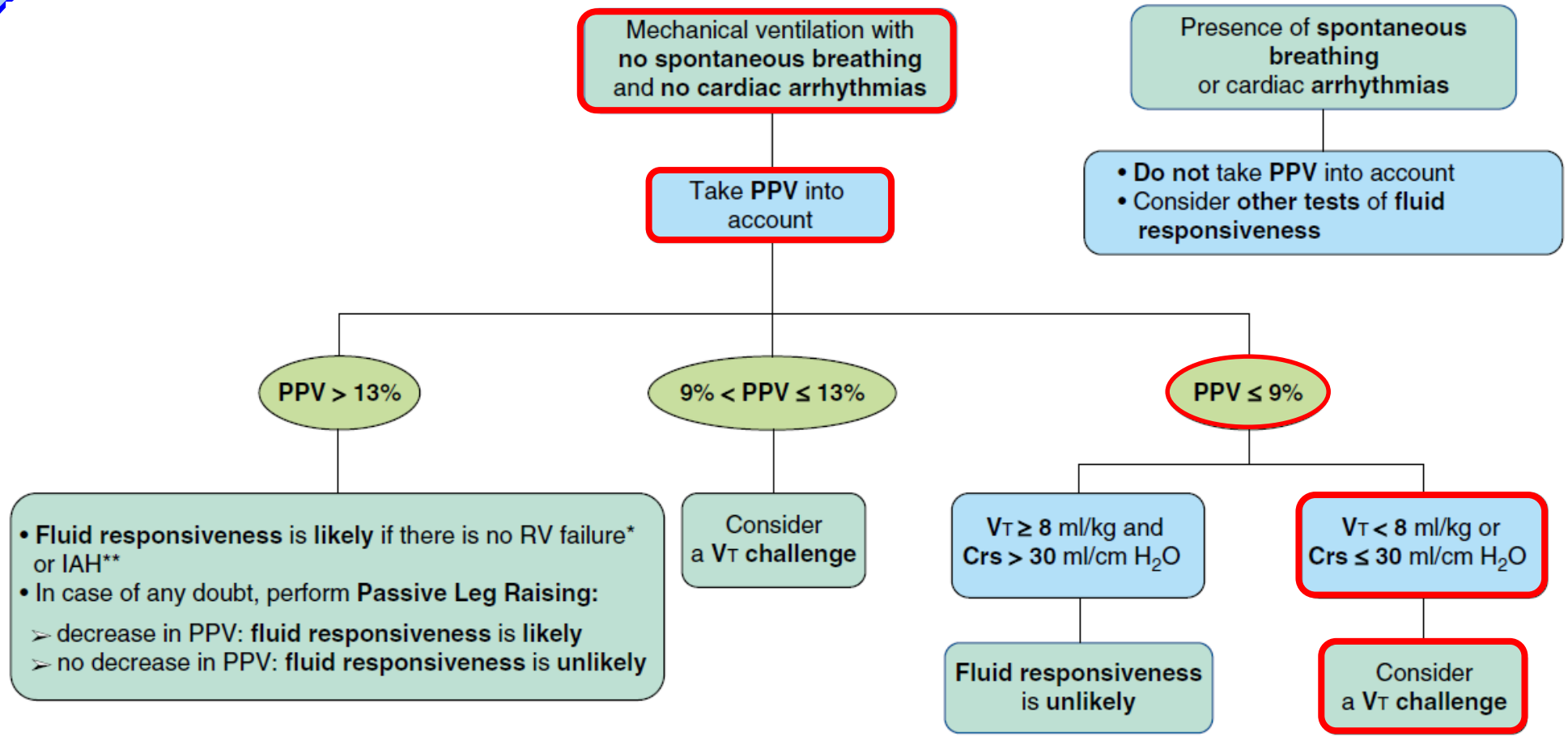
Arterial Pulse Pressure Variation with Mechanical Ventilation

Jean-Louis Teboul[1], Xavier Monnet[1], Denis Chemla[2], and Frédéric Michard[3]

Am J Respir Crit Care Med Vol 199, Iss 1, pp 22–31, Jan 1, 2019



The Changes in Pulse Pressure Variation or Stroke Volume Variation After a "Tidal Volume Challenge" Reliably Predict Fluid Responsiveness During Low Tidal Volume Ventilation*

Sheila Nainan Myatra, MD, FCCM[1]; Natesh R Prabu, MD, DM[1]; Jigeeshu Vasishtha Divatia, MD, FCCM[1]; Xavier Monnet, MD, PhD[2]; Atul Prabhakar Kulkarni, MD, FICCM[1]; Jean-Louis Teboul, MD, PhD[2]

Crit Care Med 2017; 45:415–421

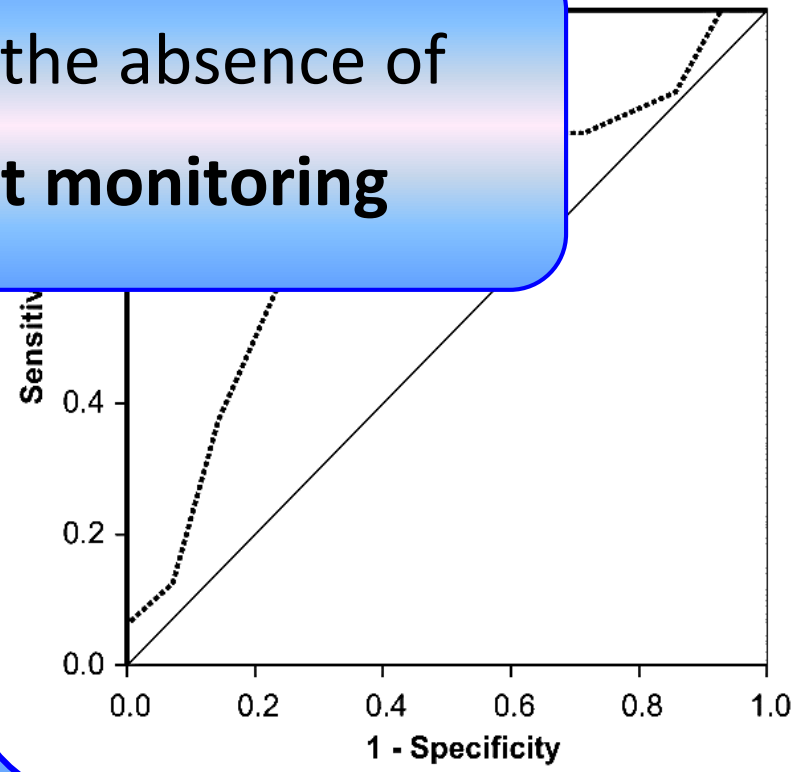
Tidal vol

Transient (

in **tidal volume**

from **6** to **8 mL/kg**

Very **helpful** in the absence of **cardiac output monitoring**



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TV challenge ΔPPV: 5 %

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CVP	**10** mmHg
PPV	**7**%

Lactate	**4.0** mmol/L

$ScvO_2$	**53**%
Hb	**11** g/dL

crystalloids	**1500** mL
NE	**0.50** µg/kg/min
Propofol	**150** mg/h
Ceftriaxone + Levofloxacin	

HR	**102** /min
AP	**110**/**55** (**74**)
CVP	**12** mmHg
PPV	**5**%

Lactate	**3.4** mmol/L

$ScvO_2$	**69**%
Hb	**10.5** g/dL

Take-home messages

1- During **septic** shock, **norepinephrine** should be initiated **early** when arterial **tone** is assumed to be **low**, e.g. when **DAP** is **low** (< 40 mmHg)

2- **Echocardiography** is the **preferred** modality to **initially evaluate** the type of **shock** as opposed to more invasive technologies

3- The **organ perfusion pressure** should be estimated from the upstream organ pressure (**MAP**) and the downstream organ pressure (most often **CVP**) and **not from MAP alone**

4- In cases of **low V_T**, **changes** in **PPV** during a V_T challenge can predict **fluid responsiveness**