ECHO

IN

SEPTIC PATIENTS

Antoine Vieillard-Baron, Boulogne, France

creased cardiac output (1). In septic shock, a complex interaction between pathologic vasodilation, relative and absolute hypovolemia, myocardial dysfunction, and altered blood flow distribution occurs due to the inflammatory response to infection. Even after the

Hollenberg CCM 2004

- **Fluid resuscitation**
- **Vasopressor therapy**
- **Inotropic therapy**

- **Echocardiography allows a functional hemodynamic monitoring**
  - **Non invasive device**
  - **Fluid challenge**
  - **LV systolic function**
  - **RV systolic function**

I

FLUID RESUSCITATION

STUDY THE VENA CAVA BY ECHOCARDIOGRAPHY

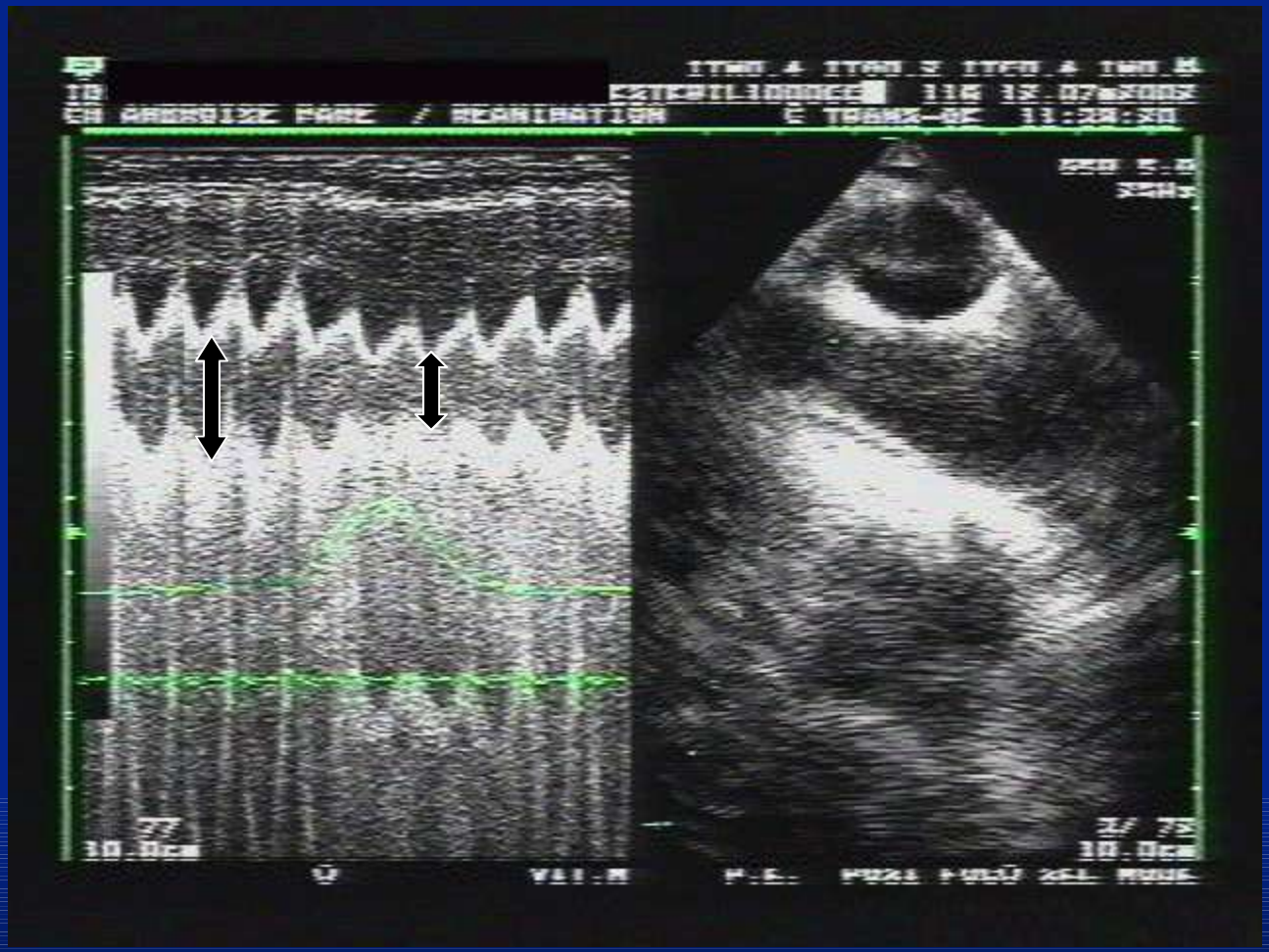
1- SVC is submitted to intra-thoracic pressure

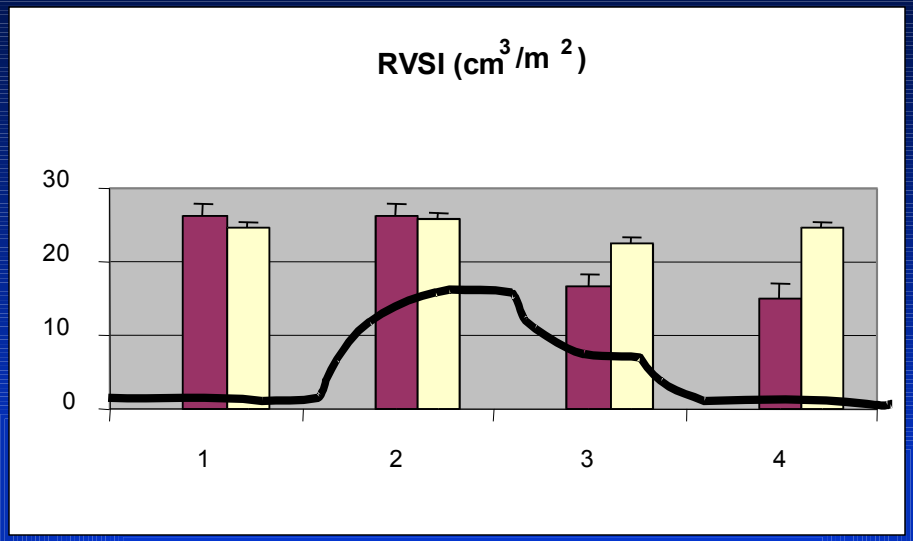
=> it can collapse in certain conditions during insufflation

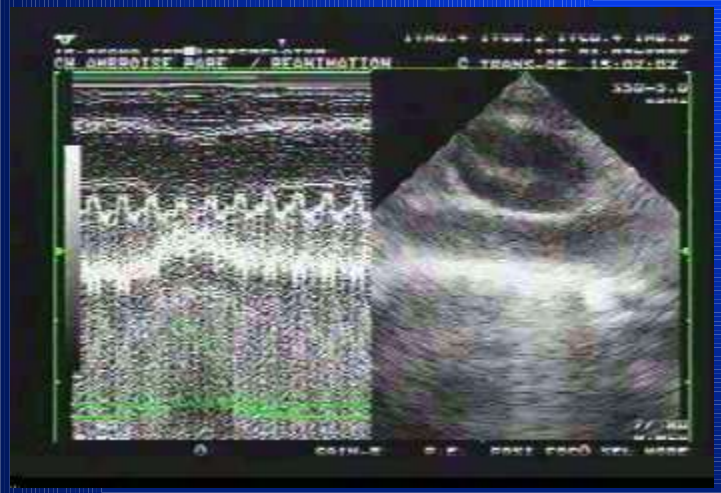
2- IVC is localized upstream from the intra-thoracic compartment and submitted to abdominal pressure

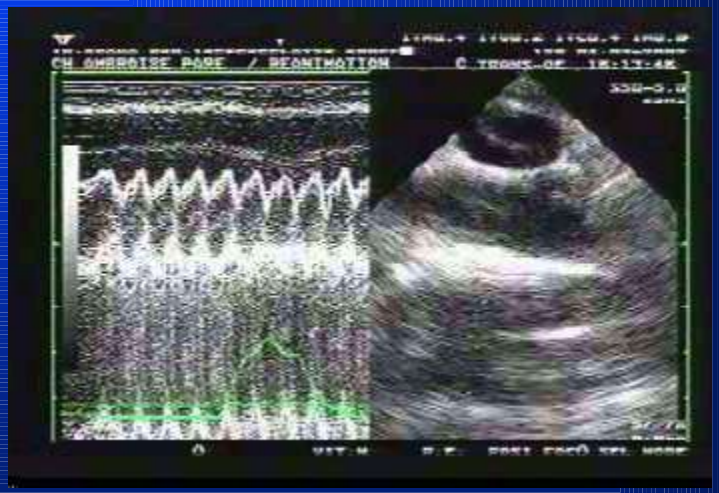
=> it can dilate during insufflation.

SVC collapsibility index = D_{max} - D_{min} / D_{max}

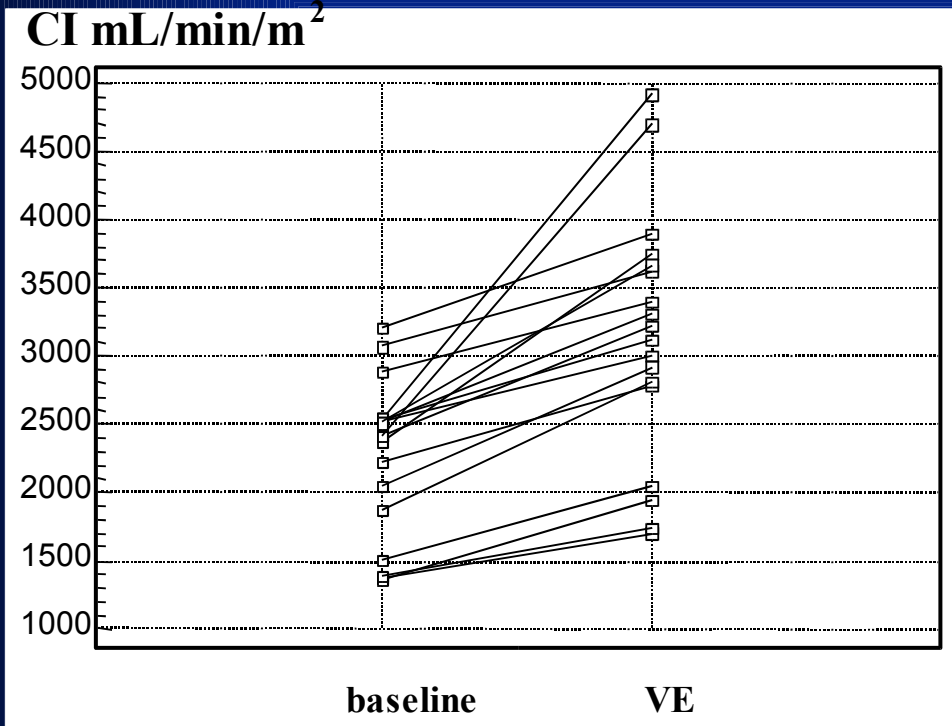


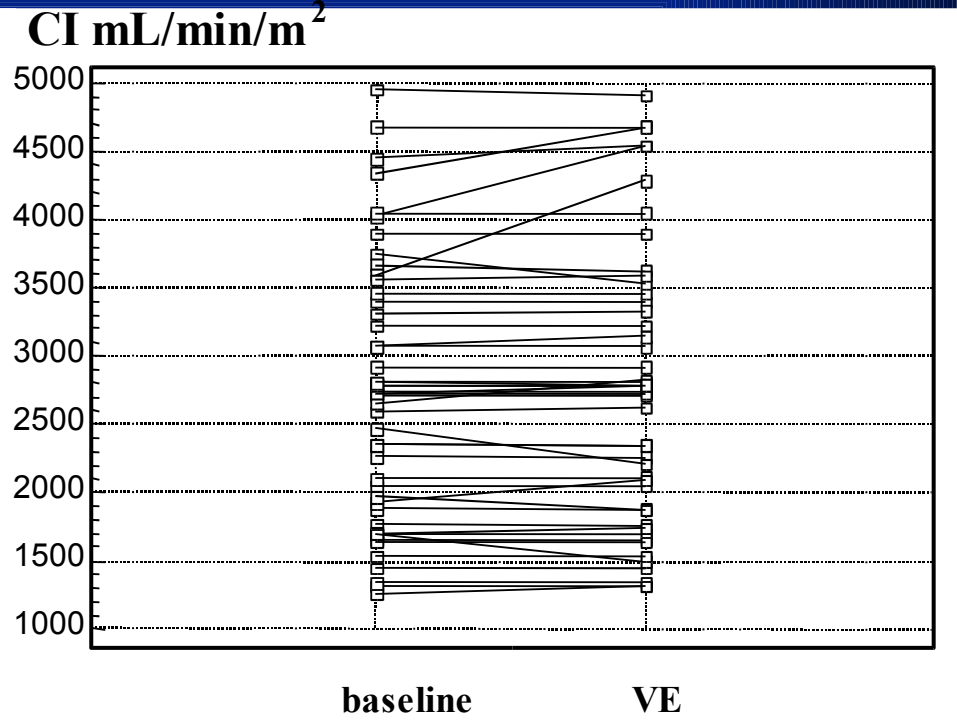






Vieillard-Baron Anesthesiology 2001



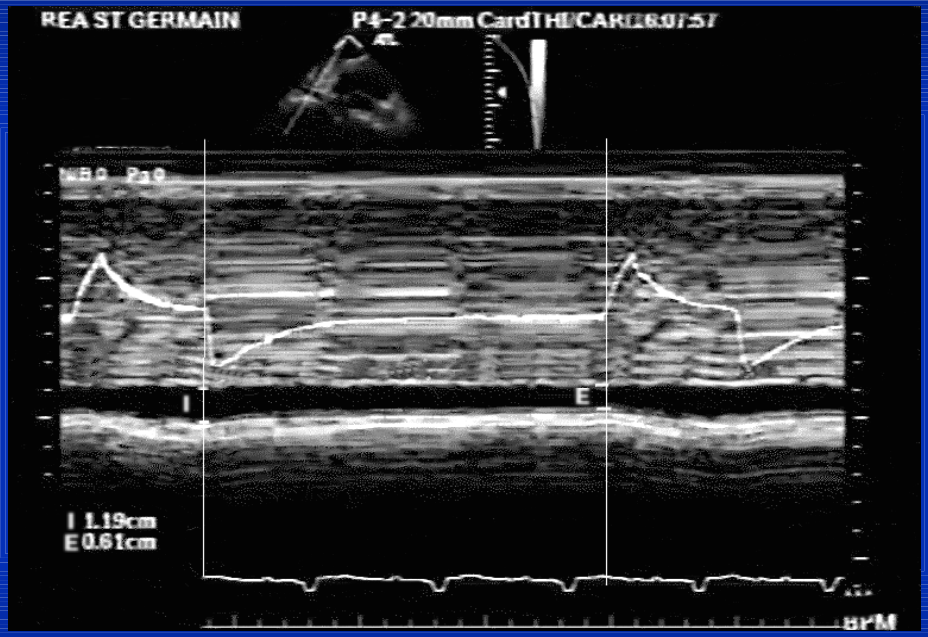


SVC collapsibility > 36%

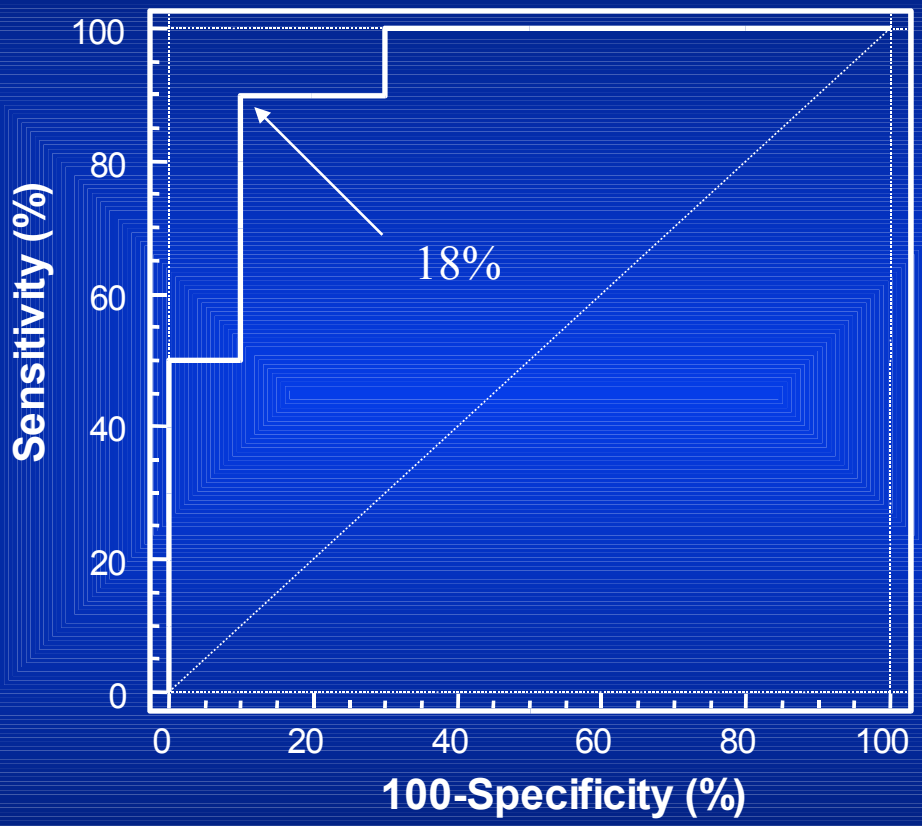
SVC collapsibility ≤ 36%

Vieillard-Baron ICM 2004

IVC distensibility index = D_{max} - D_{min} / D_{min}



dIVC = 95 %



Barbier ICM 2004

II

VASO ACTIVE DRUG REQUIREMENT

Clinical Commentary

Hemodynamic Instability in Sepsis

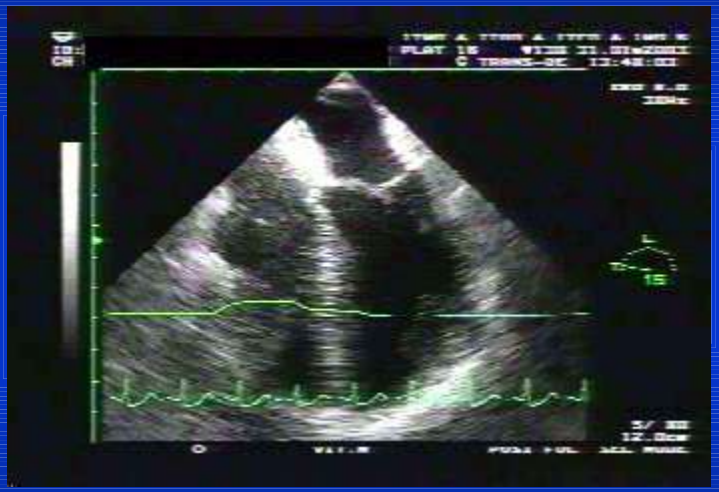
Bedside Assessment by Doppler Echocardiography

Antoine Vieillard-Baron, Sebastien Prin, Karim Chergui, Olivier Dubourg, and François Jardin

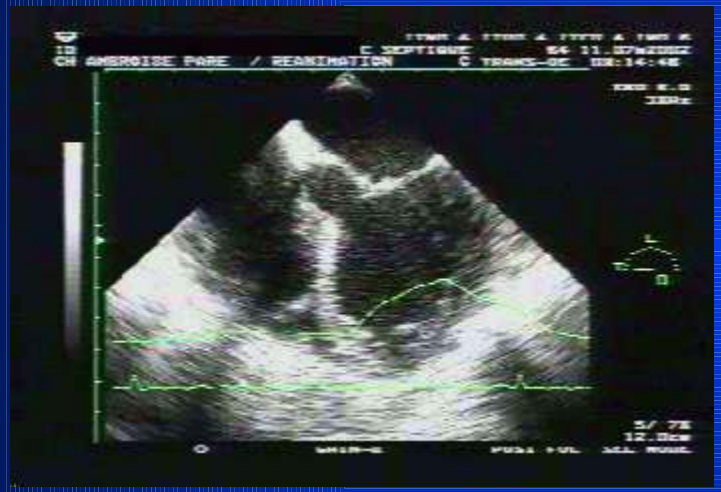
Medical Intensive Care Unit and the Department of Cardiology, University Hospital Ambroise Paré, Assistance Publique Hôpitaux de Paris, Boulogne Cedex, France

AJRCCM 2003

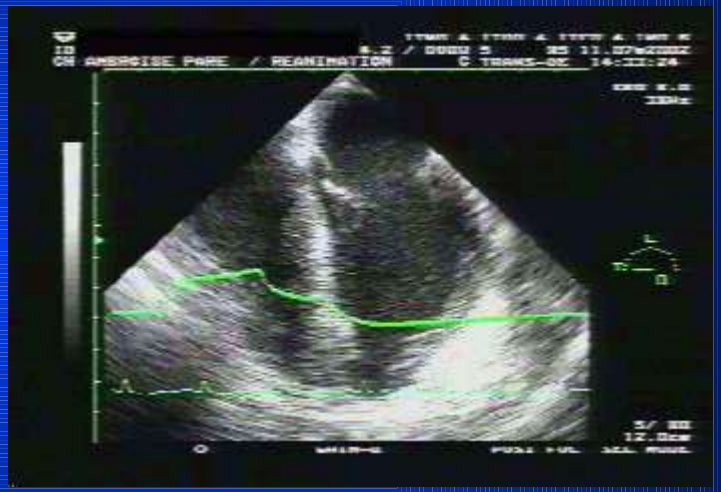
- **183 patients in septic shock without preexisting cardiac disease (1990-2000)**
  - **65% with a hyperkinetic state**
    - » **CI > 3L/min/m²**
    - » **LVEF 55 ± 13%**
  - **35% with a hypokinetic state**
    - » **CI < 3L/min/m²**
    - » **LVEF 38 ± 17%**



Hyperkinetic state



Hypokinetic state



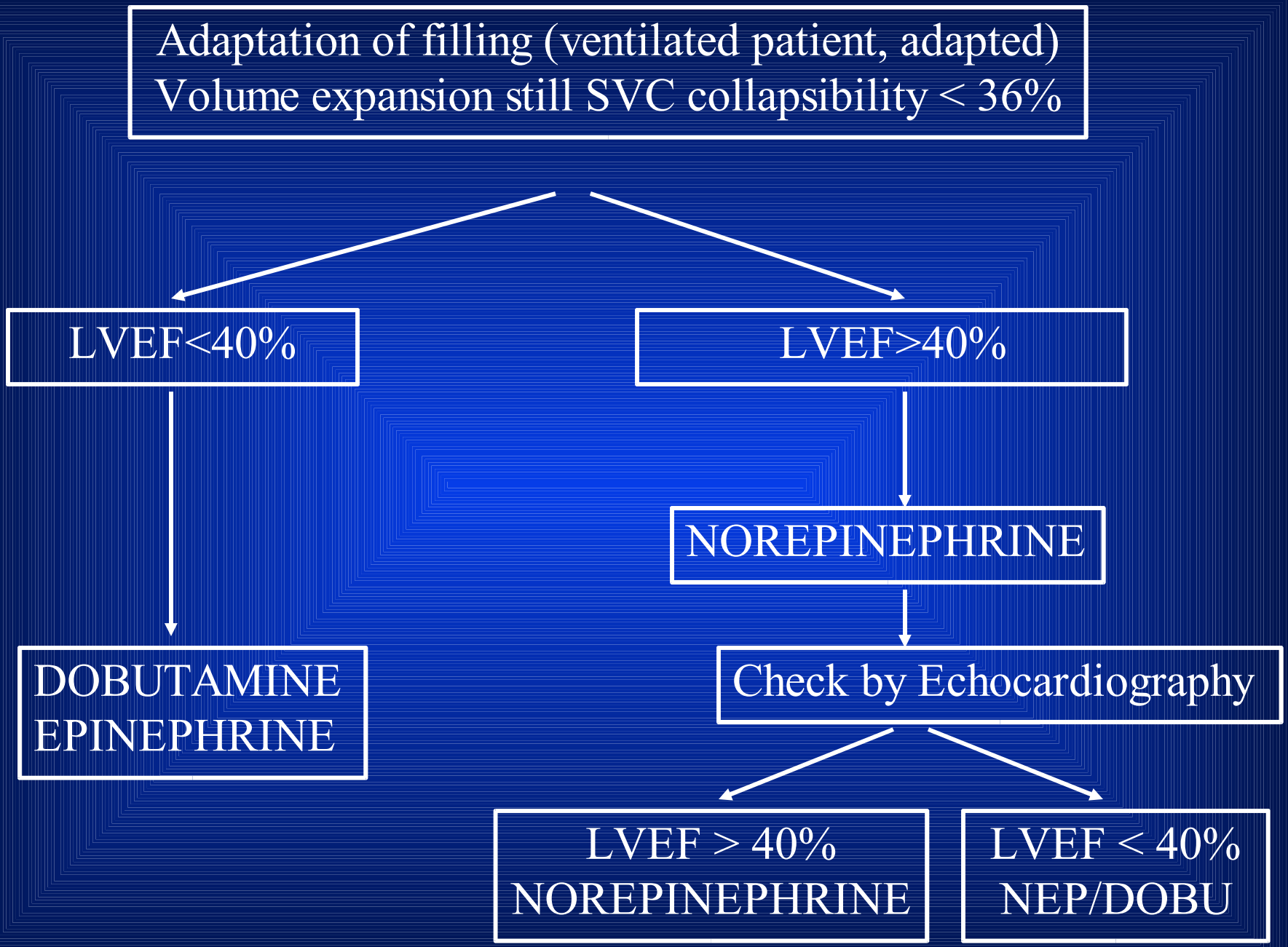
Dobutamine 5 γ/kg/min

ECHOCARDIOGRAPHY ALSO PERMITS TO CHECK EFFICACY AND TOLERANCE OF NE INFUSION

Baseline

NE infusion

Dobu and NE infusion


Adaptation of filling (ventilated patient, adapted)
Volume expansion still SVC collapsibility < 36%
LVEF<40%
LVEF>40%
NOREPINEPHRINE
DOBUTAMINE
EPINEPHRINE
Check by Echocardiography
LVEF > 40%
NOREPINEPHRINE
LVEF < 40%
NEP/DOBU

III

WHAT ABOUT THE RV FUNCTION?

Sepsis-related cardiogenic shock

FRANÇOIS JARDIN, MD; DOMINIQUE BRUN-NEY, MD; BERTRAN AUVERT, MD, PHD; ALAIN BEAUCHET, MD; JEAN PIERRE BOURDARIAS, MD

CCM 1990

» **7/21 (30%) with a biventricular systolic dysfunction**

Early Preload Adaptation in Septic Shock?

A Transesophageal Echocardiographic Study

Antoine Vieillard-Baron, M.D., Jean-Marie Schmitt, M.D.,† Alain Beauchet, M.D.,‡ Roch Augarde, M.D.,† Sebastien Prin, M.D.,† Bernard Page, M.D.,§ François Jardin, M.D.‖*

Anesthesiology 2001

» **13/40 (33%) with RV dilatation**

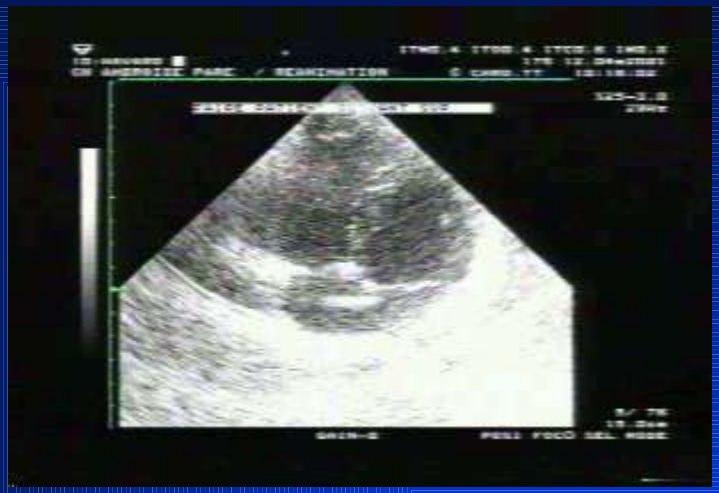
ACP IS REPORTED WHEN ARDS IS ASSOCIATED WITH SEPSIS

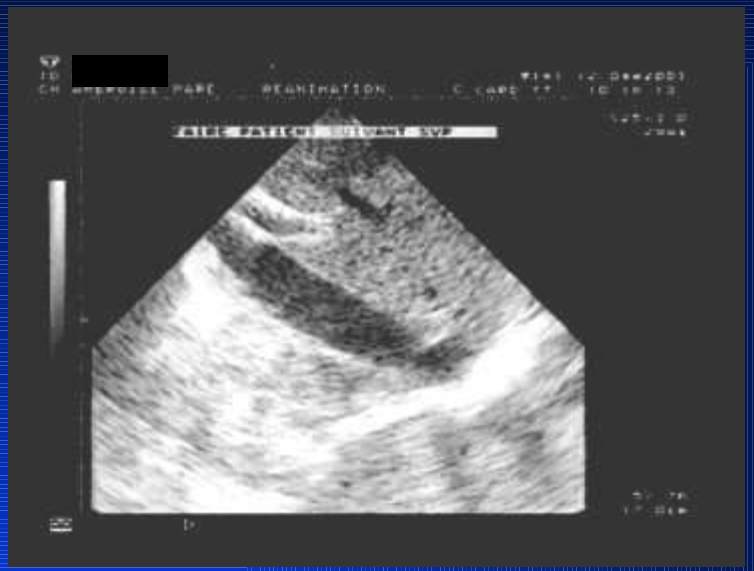
Vieillard-Baron AJRCCM 2002

INTRINSIC DECREASE IN RV CONTRACTILITY IS ALSO REPORTED

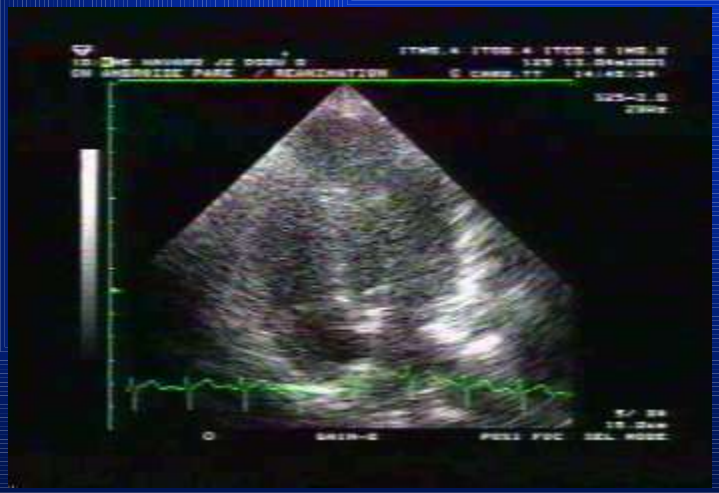
- F 19 years old, infection of the urinary tract
  - In emergency room
    - » Fever
    - » Tachycardia, SAP 65 mmHg
- After 500 ml of blood volume expansion,
  - SAP 70 mmHg,
  - Abdominal pain

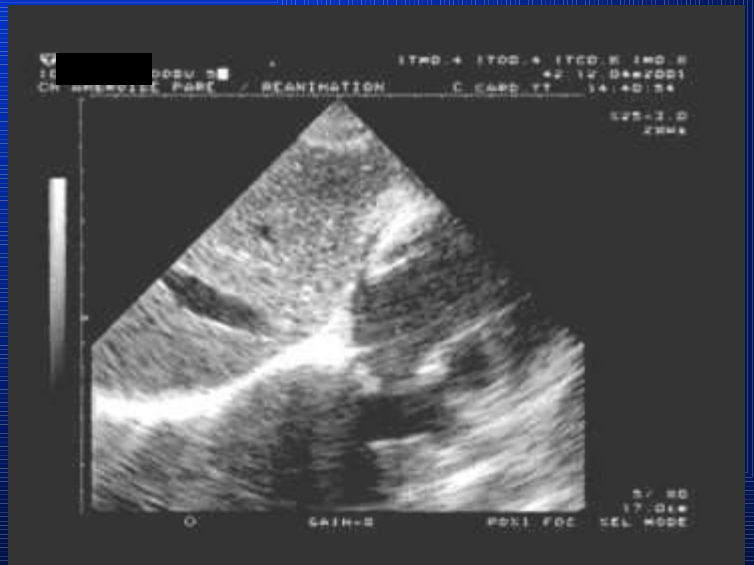
  => Blood volume expansion
- Hospitalized in ICU for circulatory failure and suspicion of peritonitis.





Dobutamine 5 γ/kg/mn





THE END

Echocardiography in intensive care - Netscape

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Service de Réanimation Médicale
Pr F Jardin, Pr A Vieillard-Baron

ECHOCARDIOGRAPHY IN INTENSIVE CARE

Français

Presentation of the unit

- Most common echocardiographic views
- Cardiorespiratory interactions
- Septic shock
- Tamponade
- ACP

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About streaming

> Home page

In the late 1980s, the Medical Intensive Care Unit of the Ambroise Paré Hospital abandoned right cardiac catheterization as a diagnostic and monitoring tool for acute circulatory and respiratory failure in intensive care. Instead we now always use transthoracic and transesophageal echocardiography in which we have acquired great expertise and experience and which we use for the diagnostic and therapeutic management of patients presenting severe sepsis, massive pulmonary embolism, or acute respiratory distress syndrome. Professor Antoine Vieillard-Baron and Dr Alain Beauchet, in collaboration with Professor François Jardin, have designed this website for intensivists and intensivists trained in anesthesiology who wish to start using echocardiography in intensive care or to upgrade their use of it. By presenting real clinical cases and video clips, all recorded in our unit, this website constitutes a genuine tool for ongoing medical training. We shall discuss and present for each disease considered the most frequently used echocardiographic indices that we have defined in recent years. Rather than describe the practicalities of performing echocardiography, which are clearly

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