Weaning
The Heart or the Lungs?

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Conflicts of interest

• Our clinical research laboratory has received research grants for clinical trials from the following companies
  – Covidien (PAV+)
  – Dräger (SmartCare)
  – General Electric (FRC)
  – Respironics (NIV)
  – Vygon (CPAP)
  – Fisher Paykel (high flow)
WIND new classification / Mortality

Weaning groups

Group 1: 6%
Group 2: 17%
Group 3: 29%
Weaning-Induced Pulmonary Edema

• Identification and mechanisms
Acute LV dysfunction during unsuccessful weaning from MV

F Lemaire, JL Teboul, WM Zapol et al. ANESTHESIOL. 1988; 69:171
Proper Reading of Pulmonary Artery Vascular Pressure Tracings

Hypothetical inspiratory transmural Ppao

Proper end-expiratory measurement

S. Magder AJRCCM 2014
Afterload RV and LV

Jubran et al, AJRCCM 1998
Weaning-Induced Pulmonary Edema

• Identification and mechanisms
• Importance of fluid overload
Anupama Upadhyya
Lisa Tilluckdharry
Visvanathan Muralidharan
Yaw Amoateng-Adjepong
Constantine A. Manthous

Fluid balance and weaning outcomes

Weaning success (n=39)  Weaning failure (n=48)
Fluid balance and reintubation

Frutos-Vivar F, Chest 2006
Fluid balance in ARDS

FACCT, NEJM 2006
B TYPE NATRIURETIC PEPTIDE AND WEANING

Mekontso-Dessap A et al ICM 2006
BNP before weaning attempt, pg/mL

Late success

Late failure

Mekontso-Dessap A et al ICM 2006
Weaning-Induced Pulmonary Edema

• Identification and mechanisms
• Importance of fluid overload
• Diagnosis
B-type natriuretic peptides for prediction and diagnosis of weaning failure from cardiac origin
ECHO (vs PAC)

Bouchra, CCM 2009
Increase in plasma protein concentration for diagnosing weaning-induced pulmonary oedema
Weaning-Induced Pulmonary Edema

- Identification and mechanisms
- Importance of fluid overload
- Diagnosis
- Cardiac dysfunction
SYSTOLIC or DIASTOLIC DYSFUNCTION

Lemaire et al, Anesthesiology 1988
Successful weaning from mechanical ventilation after coronary angioplasty

A. Demoule¹, Y. Lefort¹, M.-E. Lopes² and F. Lemaire¹*

Fig 1 Changes in leads V₄ to V₆ of the ECG before (a) and after (b) coronary angioplasty. Angioplasty is followed by ST segment depression.
Weaning-Induced Pulmonary Edema

- Identification and mechanisms
- Importance of fluid overload
- Diagnosis
- Cardiac dysfunction
- Management
Natriuretic Peptide–driven Fluid Management during Ventilator Weaning
A Randomized Controlled Trial

Armand Mekontso Dessap\textsuperscript{1,2,3}, Ferran Roche-Campo\textsuperscript{1,4}, Achille Kouatchet\textsuperscript{5}, Vinko Tomicic\textsuperscript{6}, Gaëtan Beduneau\textsuperscript{7}, Romain Sonneville\textsuperscript{8}, Belen Cabello\textsuperscript{4}, Samir Jaber\textsuperscript{9}, Elie Azoulay\textsuperscript{10}, Diego Castañares-Zapatero\textsuperscript{11}, Jerome Devaquet\textsuperscript{12}, François Lellouche\textsuperscript{13}, Sandrine Katsahian\textsuperscript{14}, and Laurent Brochard\textsuperscript{1,2,3,15}

\[**p<0.01\] between usual weaning and BNP-guided weaning

\[*p<0.05\] between usual weaning and BNP-guided weaning

\[\text{Furosemide daily dose (mg)}\]

\[\text{Fluid balance (mL)}\]
Weaning: Heart or Lungs?

- Fluid overload and/or cardiac dysfunction are among the main causes of difficult weaning
- Cardiac biomarkers may help to detect, prevent and treat fluid overload
- Specific cardiac mechanisms may need to be sorted out for appropriate therapy