Ex-Vivo Lung Perfusion (EVLP): An Evolving Technique

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Disclosures

- No financial disclosures at this time

- I am a perfusionist and I believe perfusionists need to be involved with EVLP
What We’ll Cover

▪ State of organ transplants

▪ Ex Vivo perfusion

▪ The Transmedics OCS device and EXPAND trial

▪ Team training

▪ Typical EVLP run

▪ Results so far
The State of Organ Transplantation

Organ Donors

- *30,973 Organ transplants in 2015
- 121,411 on active organ transplant list
- 22 people die everyday waiting for a transplant

Lung Transplants

- 1,521 active on waiting list for a lung transplant
- **Less than 20% of lungs from multi-organ donors deemed suitable for transplantation

* National Data. United Network for Organ Sharing. Available at: https://www.unos.org/data/

Ex Vivo Perfusion

Definition
- **Ex Vivo**: “Outside the living body”
- **Perfusion**: “The passage of a fluid through a specific organ or an area of the body”

What Organs?
- Lungs
- Heart
- Liver

Lung Devices
- Transmedics OCS
- XVIVO XPS
- Vivoline LS1
- Organ Assist Lung Assist
EVLP Devices

Transmedics OCS
- Pump: Piston
- Ventilator: Yes
- Solution: OCS (w/PRBCs)
- Transport: Yes
- Flow: 2-2.5 LPM (<20mmHg)

XVIVO XPS
- Pump: Centrifugal
- Ventilator: Yes
- Solution: Steen
- Transport: No
- Flow: 40% C.O.

Vivoline LS1
- Pump: Roller
- Ventilator: No
- Solution: Steen (w/PRBCs)
- Transport: No
- Flow: 100% C.O.

Organ Assist Lung Assist
- Pump: Centrifugal
- Ventilator: No
- Solution: Steen
- Transport: Yes
EXPAND Trial

Trial details
- Started in November 2013
- Planned enrollment of 75
- Extended criteria, Non-Controlled

Inclusion criteria
- Age > 55 years old
- PO2:FiO2 ratio less than 300
- Ischemic time > 6 hrs
- Donor after cardiac death

Outcomes
- Composite outcome of 30-day survival and no Primary Graft dysfunction within first 72 hours
Transmedics Training

- Five-member team
- Two day training in simulation operating room
- Porcine lungs used to replicate a real organ procurement
- Transmedics training wheels with first runs
- Several “Dry Runs” within MGH to replicate run procedures
EVLP Run Timeline

Preparing the Device

- Install the module
- Pass Self-Test
- Stock run bag
  - OCS Solution on ice (12L)
  - Syringes
  - Drugs
  - iStat with cartridges
  - PRBCs (3 units)
  - Disposables
EVLP Run Timeline

Out on the Run

- Transportation
- Accept lungs
- Prepare drugs
- Prime device & run baseline blood gas
- Install lungs
- Begin perfusion and ventilation
- Assess lung function
EVLP Run Timeline

Back at MGH

- Run blood gas
- Assess lung function
- Split lungs
  - Reduce TV and blood flow
- Flush first lung at back table (Antegrade/Retrograde)
- Flush second lung (Antegrade) on device and on back-table (Retrograde)
Results This Far

Number of runs
- 5 successful double lung transplants on OCS device have been completed

Average Cold Ischemic Time
- First lung: 127 mins
- Second lung: 118 mins

Average time on OCS device
- First lung: 299 mins
- Second lung: 429 mins

Average increase in PO2
- 170 mmHg
How does Perfusion Fit in this Puzzle

EVLP fits well within our scope of practice

- Extracorporeal Support
- Organ Preservation
- Surgical Assistance
- Organ Procurement
- Administration of blood components, pharmaceuticals, and anesthetic agents
- Works in partnership with other healthcare professionals to provide the best medical care possible for all patients
- Physiological monitoring, analysis and intervention
Thank You to the MGH EVLP Team

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