Mitigating Risk when Monitoring Arterial Line Pressure with Integrated Filtration

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Disclosures

- I have no disclosures
Overview

- The use of integrated arterial filtration eliminates a bubble trap from the CPB circuit
- Monitoring arterial line pressure (ALP) without this trap is a potential source of lethal air embolism
- Careful consideration must be given to how it will be measured
- Case report discusses a potentially disastrous situation
- A well thought out solution is presented
Arterial Line Pressure Monitoring

- Is essential for monitoring pressure in the arterial line (AmSECT Standard 7.2)
- Has been shown to reduce risk of aortic dissection
- Reduces risk of cellular injury
- Can be used to assess blood pressure of patient
- Can be a source of air embolism
History of Arterial Line Pressure Monitoring

- Typically measured from the inlet side of arterial filter
- Monitored with either electronic pressure transducer or aneroid manometer
- Transducer is commonly calibrated at the height of the right atrium
- With integrated arterial filtration, has been measured at a position in the arterial line, recirculation line, or other location
Mini Case Presentation

- Patient undergoing CPB for CABGx3 with IMA
- Group transitioning from external in-line arterial filter (AF) to integrated AF
- Initially arterial line pressure (ALP) was monitored off a site on the AF bypass line
- After 50 procedures, the AF was removed and ALP was measured off a port in the arterial line
Mini Case Presentation cont’d

- After the CPB loop was handed off, air was noticed in the arterial line...near miss!

- Source of air was found to be the transducer used to monitor ALP

- Transducer cap crack was noted

- Since the transducer was at a height higher than the AV loop, it was determined that the was pulled into the transducer line and into the arterial line
The transducer was replaced and cleared of air.

The prime solution was re-circulated and the air removed.

After reconfirming an air free AV loop, the lines were re-clamped and readied for cannulation.

Safer method for monitoring ALP was necessary.
Introduction
Introduction
Typical ALP Setup

Transducer Height at the level of the heart
Recommended ALP Setup with Integrated ALF

Transducer Height at the lowest level of the CPB circuit, 26 inches.
Artificially High Line Pressure with Recommended ALP Setup

Lower the ALP Transducer

50 mmHg
1 mmHg = 1.34 cm H₂O
1 inch = 2.54 cm

26 inches = 50 mmHg

26 inches

Transducer Height at the lowest level of the CPB circuit.
Corrected Line Pressure with Recommended ALP Setup cont’d

Lower the ALP Transducer

To correct for higher line pressure, re-zero transducer at lower level

Transducer Height at the lowest level of the CPB circuit

26 inches
Methods
Results of Lowering ALP Transducer

- Safety of reduced air embolism risk
- Easy to do
- Pressure similar to the mean arterial pressure
- ALP is not over estimated
- No incidents in over 5000 procedures!
Take Home Points

- Technique is easily achieved
- Improves patient safety with Integrated Arterial Filtration
- Provides more accurate assessment of cannula situation
- Adds ability to determine patient mean blood pressure when off of CPB