

C-26 Perioperative Management of Patient with Pulmonary Hypertension Undergoing Non-cardiothoracic, Non-obstetric Surgery

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Objective

After completion of this session, the participant will be able to:

- Formulate an anesthetic plan for the management of a patient with pulmonary hypertension.

Case Stem Question

Perioperative management of patient with Pulmonary Hypertension undergoing non-cardiothoracic, non-obstetric surgery.

71-year-old male with H/O of recent dx of severe pulmonary hypertension, ischemic cardiomyopathy, mechanical aortic valve with chronic anticoagulation, h/o of ESRD on HD via AVF for > 40 years suffered a ground level mechanical fall resulting right distal femur Fx & left proximal tibial Fx. Initial orthopedics recommendation was conservative therapy with non-operative plan. But this would result in patient being non-weight bearing and essentially crippling the patient for the rest of his life. Patient strongly desired surgical intervention. Therefore, anesthesia was consulted to investigate if a patient with such complicated medical history can undergo planned procedure in a community hospital without cardiac anesthesia service.

Patient Information:

- Height: 196cm, Weight: 75kg, BMI: 19
- Allergy: Valacyclovir
- Vital Signs: Blood Pressure 90/50 mmHg, Heart Rate 64 bpm, Respiratory Rate 16 breaths/min, Oxygen Saturation 98% on room air
- Physical Examination: Cachectic appearance, dysphonia, mild distress due to pain, Mallampati Class I airway, full neck range of motion, no history of anesthesia complications, mechanical click auscultated, no clear murmurs, clear lung sounds, abdominal examination unremarkable, exquisitely tender lower extremities with movement but no clear deformities noted post-orthopedic reduction
- Vascular Access: Thriving right upper extremity AVF, left upper extremity 18-gauge peripheral intravenous catheter

Further Investigations:

- Right Heart Catheterization (RHC): Mean Pulmonary Arterial Pressure (PAP) 92/24 mmHg, Pulmonary Capillary Wedge Pressure (PCWP) 30 mmHg, Right Ventricular Pressure (RVP) 91/6 mmHg
- Left Heart Catheterization (LHC): Large inferior and lateral left ventricular infarction with surrounding ischemic area, Left Ventricular Ejection Fraction (LVEF) 40%
- International Normalized Ratio (INR): 3.3
- Complete Blood Count (CBC): Hemoglobin 4.6 g/dL, Hematocrit 10.5%, Platelets 33,000/mm³, White Blood Cells 15,600/mm³
- Basic Metabolic Panel (BMP): Sodium 134 mmol/L, Potassium 5.7 mmol/L, Bicarbonate 92 mmol/L, Blood Urea Nitrogen (BUN) 23 mg/dL, Creatinine 6.94 mg/dL

Questions

Based upon what you know about this patient, how would you classify his Pulmonary Hypertension?

Based on the hemodynamic data from this patient's most recent cath- how would you categorize the severity of the pulmonary hypertension?

How do you perform preoperative risk assessment of this patient?

What are the risk factors associated with pulmonary hypertension which increase the risk of death?

Does the patient have modifiable risk factors? Are there any medications that may help optimize him?

Where should the surgery on patient with PH be performed?

Do you think the patient should be taken to OR today or surgery should be post-poned?

Would the surgeons at your institute agree for conservative management?

How do you predict risk and take informed consent from this patient?

How would you perioperatively monitor this patient?

How do perioperatively optimize this patient? Would you use pulmonary vasodilator therapies intraoperatively?

What specific measures you take for intraoperative management for this patient?

Once surgery is done, how do you post operatively manage this patient?

Case continued...

Patient was admitted to a community hospital with excellent quality coverage from subspecialties including combined medical & surgical ICU, geriatric fracture, and experienced anesthesia group. However, this hospital is not equipped with services from cardiac ICU, cardiac surgery or cardiac anesthesiology service. However, there is a big academic hospital only about 5 minutes away .

Discussion with the patient confirmed patient's strong desire for surgical intervention in hopes of regaining mobility and independent life style. It also revealed recent diagnosis of severe pulmonary hypertension and referral to a local expert. However, patient didn't get to see the pulmonary hypertension specialist and was not started on therapy. Patient was also recently referred to palliative care as his ischemic cardiomyopathy, severe pulmonary hypertension, decline in overall function with weight loss, hypotension limiting hemodialysis all suggested limited life expectancy. He signed DNR / DNI form. He was okay to rescind DNI and certain parts of resuscitation orders. But he continued to maintain no chest compression and no ECMO.

Given patient's strong opposition for possible ECMO therapy in case of sudden, catastrophic heart failure, which can occur during anesthesia care for the proposed procedure, decision was made to keep the patient at Highland hospital and not transfer him to bigger academic center.

His INR was reversed with Vit K. Pre-op INR was 2.1. He was dialyzed the day before. He was kept NPO overnight. And he presented to pre anesthesia area. consents were obtained from the patient and his wife. Okay to intubate and resuscitate with

medications, fluids and blood transfusion. However, no chest compression no ECMO. He was brought into the OR. Awake RIJ TLC placement with initiation of milrinone infusion. Awake left brachial arterial line placement. He was induced with ketamine, etomidate and rocuronium. He was intubated with RSI. He was connected to ICU ventilator with epoprostenol neb. Anesthesia was maintained with propofol infusion. Mirilinone infusion continued; and epinephrine infusion and multiple boluses followed. Patient tolerated the procedure without major complication. He was taken to the ICU with epoprostenol neb, milrinone and epinephrine infusion still infusing. Patient received blood transfusion, dialysis therapy the following days. On POD2, he was successfully extubated.

Guiding Questions for Discussion

What is Pulmonary Hypertension?

Pathophysiology of Perioperative RV failure?

Perioperative outcome of patients with Pulmonary Hypertension?

How do you do preoperative screening, planning and risk assessment of a patient with pulmonary hypertension?

Where should surgery on patient with pulmonary hypertension be performed?

How can you preoperatively optimize this patient for surgery?

What are the specific intraoperative and postoperative management protocols for this patient?

References

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