How do you work up a patient with chronic thrombo-embolic pulmonary disease

Vikas Aggarwal MD, MPH
Interventional Cardiologist
University of Michigan
@vikasaggarwalmd

Robert P. Frantz MD, FACC
Director, Mayo Pulmonary Hypertension Clinic
Professor of Medicine,
Department of Cardiovascular Medicine
@RobertF49094955
Frantz.Robert@mayo.edu
Disclosures

Vikas Aggarwal: I have no relevant relationships with commercial interests to disclose.

Robert Frantz:
Consulting/Steering Committee: Janssen, Liquidia.
Review of proposed research submissions without personal financial benefit: Bayer
Case: 70 year old man, functional class III dyspnea

- Massive PE requiring air evacuation, lytic therapy 20 years ago
- A/C for 2 years, then stopped
- Diverticulitis, temp colostomy, multiple bowel operations 13 years ago
- TIA 12 years ago; PFO closed with Amplatzer device
- E coli sepsis with spinal involvement after prostate biopsy 10 years ago; prolonged hospital stay, needed spinal rods
- Recurrent PE 1 ½ years ago; dyspnea persisted despite A/C
- Persisting dyspnea prompts consideration of CTEPH
Evaluation
• History, exam, ECG, CXR, PFTS with DLCO, basic lab work including CBC, electrolytes, NTproBNP
• Consideration of special coagulation studies
• Echo with attention to RV
• Ventilation/Perfusion Lung scan with SPECT
• CT angiography
• 6 min walk
• Cardiopulmonary exercise testing
• Right heart catheterization
• Planar pulmonary angiography or DynaCT
• Multidisciplinary case review
Noninvasive Cardiopulmonary Exercise Testing

• Cardiac output response (cardiac limitation to exercise)
• Particular attention to ventilatory efficiency
  • (VE/VC02 slope)
  • With successful BPA or open surgery, ventilatory efficiency will improve due to improvement in ventilation/perfusion matching (reduced dead space ventilation)
Ventilation/Perfusion Lung Scan
Right Posterior Oblique V/Q Scan
SPECT Fusion Images
Right Heart Catheterization
Coronary angiography if potential for open surgery
Consider iCPET if CTED, unclear relationship of symptoms and disease

• RA 8 PA 59/14/33 PCW 10 CO/Cl 4.6/2.3 PVR 5 WU
Selective rotational pulm angio with DynaCT
Pathway for Decision Making in CTEPH

Operable?
- Technical
- Proportionality of PH relative to CTEPH burden
- Comorbidities, Frailty

Willing to Have Operation?
If not operable or willing, is disease and patient amenable to BPA? If not, riociguat

Amenable to BPA
Schedule BPA with or without pretreatment with riociguat (dependent on mPA pressure > or < 35mmHg)
Patients with inoperable or residual CTEPH who are considered for BPA

• If mean PA > 35, initiate riociguat before BPA
• If mean PA < 35, may proceed with BPA without use of riociguat, or may add it to assist with improvement during the BPA process
Our patient had two sessions of BPA separated by two months (distant travel)

• Session 1: Right A5, A8, A9 segments
• Follow up just prior to second session:
  • He has no longer been needing oxygen during the day. He has been able to be quite a bit more active in his yard, digging trenches and so forth. He will still get out of breath with walking their new dog.
  • Overall he seems improved to functional class II. His VE/VCO2 nadir on cardiopulmonary exercise testing today is 40, improved from 44 in July of this year. The VE/VCO2 slope is 39.9, down from 41.4 in July of this year.
Balloon Pulmonary Angioplasty of Larger Segment
Post Procedure Care

- Hospital observation, usually overnight
- CXR am of dismissal, or sooner in event of worsening oxygenation, dyspnea, severe cough, hemoptysis
- Clear strategy for bridging anticoagulation
- Systematic reevaluation of symptoms, exercise tolerance, echo, hemodynamics, NTproBNP
- Serial sessions at least a few days apart
- Consider whether to continue or discontinue riociguat if utilized
Our patient had two sessions of BPA separated by two months (distant travel)

• Session 1: Right A5, A8, A9 segments
• Session 2: Right A3, A4 segments
• Felt so much better he declined to return for reassessment or additional sessions
• Continues to do well 4 years later
Conclusions

• Systematic evaluation of symptoms, cardiac function, exercise limitations, hemodynamics, and cardiopulmonary physiology
• Thoughtful and thorough imaging
• Multidisciplinary team-based, patient centric decision making

• Frantz.Robert@mayo.edu

SCAI
Society for Cardiovascular Angiography & Interventions