

Platypnea-Orthodeoxia Syndrome Following Abdominal Surgery

Andrew M. Goldsweig, MD, MS, FSCAI

Scott M. Mawer, DO, MS

David T. Shin, DO, MS

Kristen N. Brown, MD

University of Nebraska Medical Center



SCAI

Society for Cardiovascular
Angiography & Interventions

© 2020-2021 Society for Cardiovascular Angiography and Interventions (SCAI).
All rights reserved.

Disclosures

I have no relevant relationships with commercial interests to disclose.



SCAI

Society for Cardiovascular
Angiography & Interventions

SCAI COPYRIGHT RELEASE FORM

I make the following representations and grant the following rights to SCAI - The Society for Cardiovascular Angiography and Interventions (SCAI):

I warrant that the presentation and all accompanying written, pictorial, and video material (collectively the "Work") is original with me or that I have obtained the necessary rights to make this release, and that its presentation and publication will not infringe the rights of others.

I grant to SCAI the perpetual, royalty-free, nonexclusive right to the use, transfer, adapt, and sell the Work at our annual conference and world-wide, including at our other meetings and on our website and by other electronic and other means, and in any other place, medium, format, charge, or language as determined by SCAI.

I grant to SCAI the right to use my name, likeness, photograph, and biography in connection with the Work in whatever form, fashion, or medium, including print, electronic, or otherwise for as long as SCAI wishes.

Name: Scott Mawer

Date: 3/17/2022



This slide will be removed before publication.

Approval

Council Review:

Education Staff Review:

- Peer Review for CME (if needed):
- CME Review Resolution (if needed):



SCAI admin only slide. Will be removed before publication.

Insert Your Headshot Below



Patient History

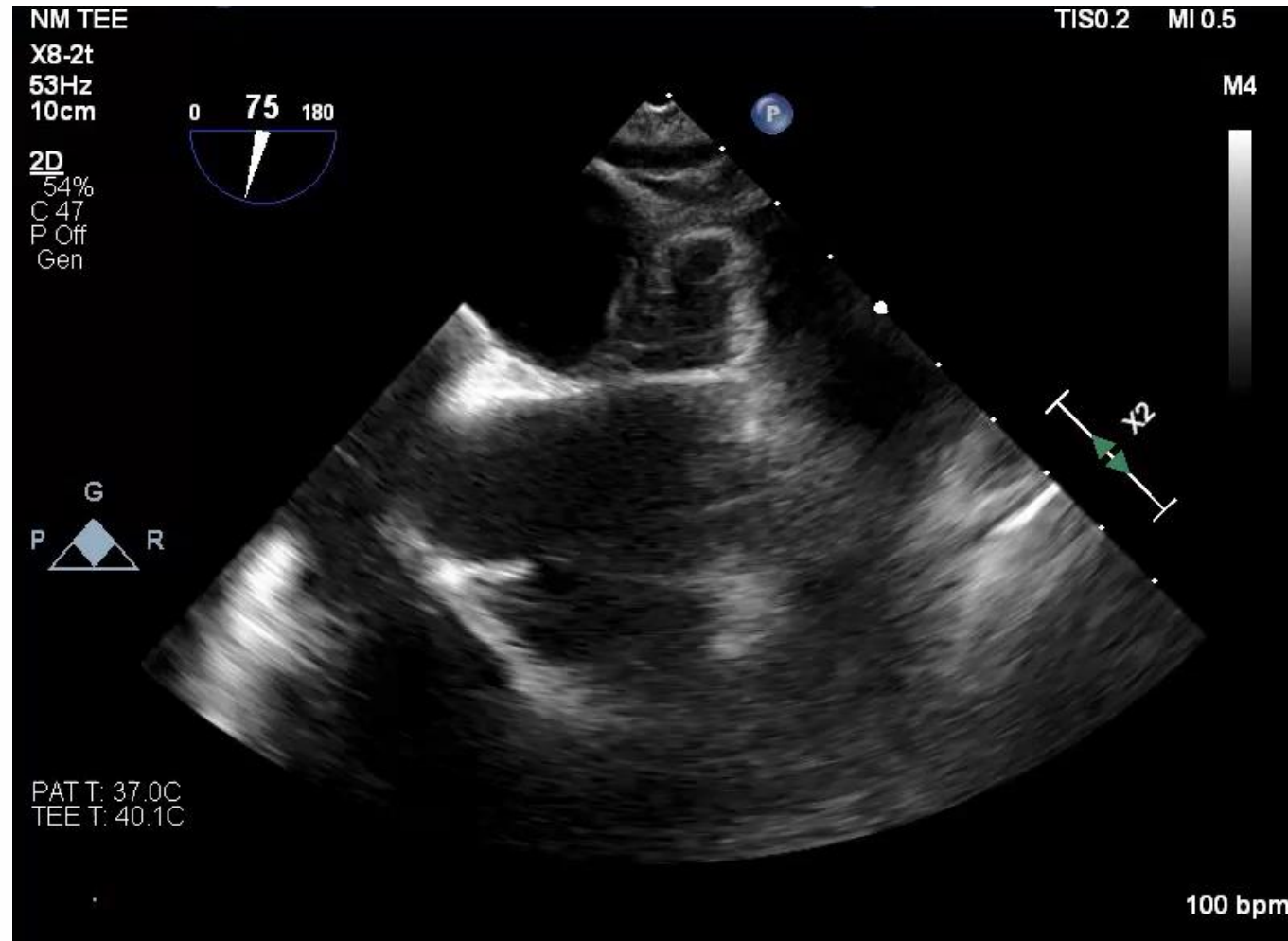
- 64-year-old Caucasian male hospitalized for surgical management of sigmoid colon adenocarcinoma developed acute hypoxic respiratory failure immediately post-operatively. Noted to have a large patent foramen ovale (PFO) on echocardiogram with continuous right-to-left shunting and aneurysmal interatrial septum with leftward bowing.
- Medical History
 - Stage IV adenocarcinoma of the colon with liver metastases s/p FOLFOX and bevacizumab, subsequent left hemicolectomy, right hepatic lobectomy, microwave ablation of segments II and III, and cholecystectomy
 - Prior R-sided pulmonary embolism on rivaroxaban chronically



SCAI

Society for Cardiovascular
Angiography & Interventions

Transesophageal Echocardiogram with Bubble Study



SCAI

Society for Cardiovascular
Angiography & Interventions

Medical Therapies to Decrease Shunting

- Diuretics to reduce RA preload
- Vasopressors to increase afterload, LA pressure
- Inhaled epoprostenol to reduce pulmonary pressures



SCAI

Society for Cardiovascular
Angiography & Interventions

Diagnostic Right Heart Catheterization

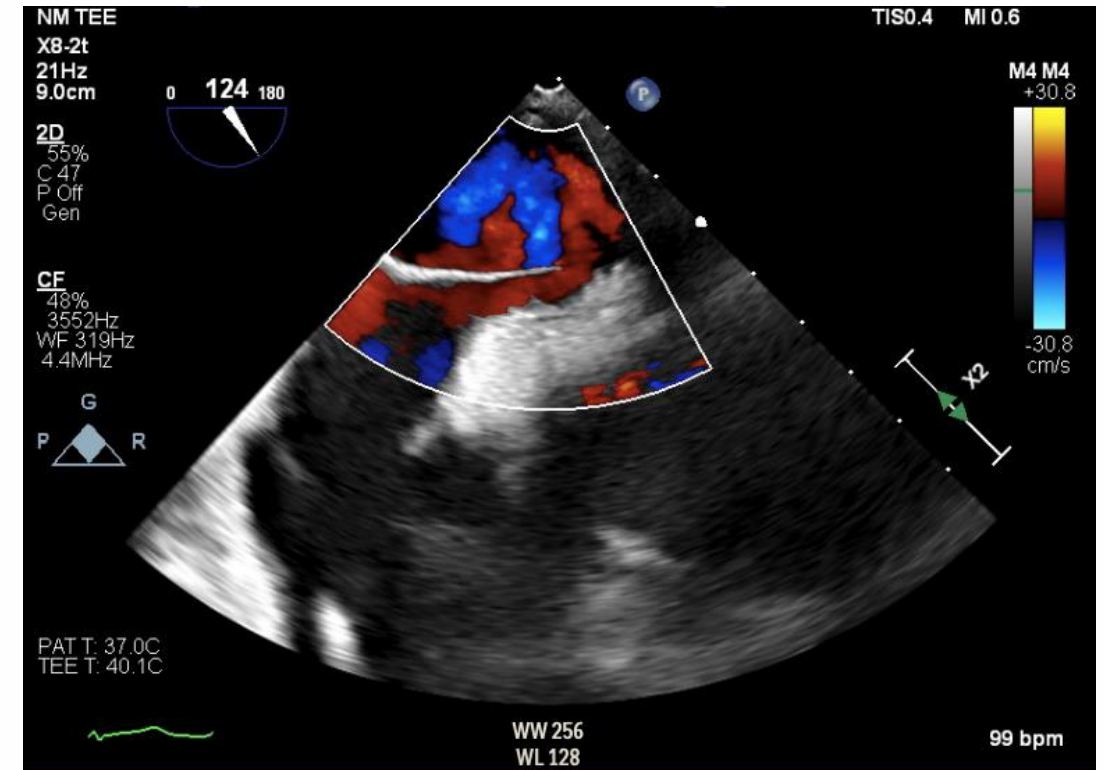
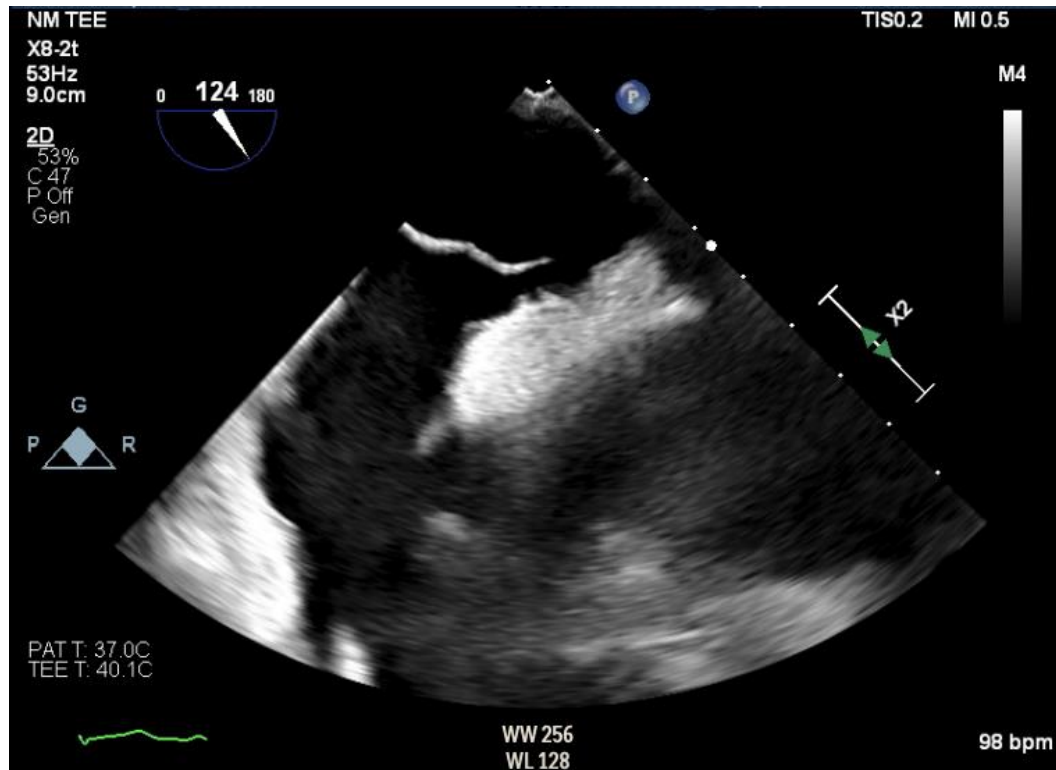
- Patient receiving 20,000 ng/mL inhaled epoprostenol
- Pressures
 - Arterial BP: 106/65 (77)
 - RA: 1
 - RV: 17/-1 (0)
 - PA: 21/2 (11)
 - PCWP: 5
- O₂ Saturation (on 100% FiO₂)
 - High RA O₂ saturation: 48%
 - Low RA O₂ saturation: 44%
 - RV O₂ saturation: 40%
 - PA O₂ saturation: 43%
 - PW O₂ saturation: 78%
 - **Ao O₂ saturation: 83%**
- Normal limited pulmonary angiogram



SCAI

Society for Cardiovascular
Angiography & Interventions

Transesophageal Echocardiogram



SCAI

Society for Cardiovascular
Angiography & Interventions

PFO Closure

- Able to wean to 3 L/min supplemental O₂ via NC with medical therapies to decrease shunting
- Concern for continued R->L shunting via PFO, most likely secondary to anatomic positional changes related to abdominal surgery
 - Redirection of IVC return toward interatrial septum versus diaphragmatic contour changes that reposition the heart
- Ultimately, decision made to close PFO percutaneously due to continued hypoxia
 - PFO-mediated hypoxia generally grouped with platypnea-orthodeoxia syndrome, though hypoxia not positional for this patient

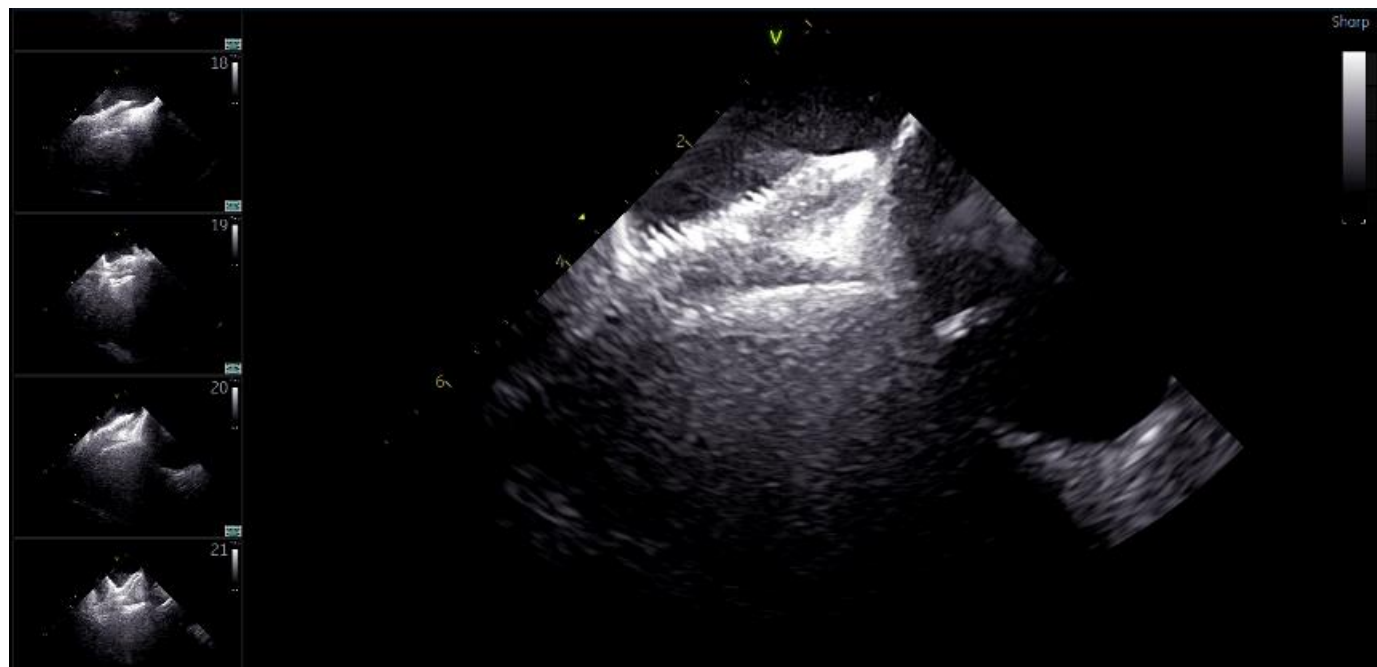


SCAI

Society for Cardiovascular
Angiography & Interventions

PFO Closure Continued

- 30 mm Amplatzer Talisman PFO Occluder was deployed across the defect
- No residual leak identified
- SpO₂ improved to 95% on room air instantaneously following closure

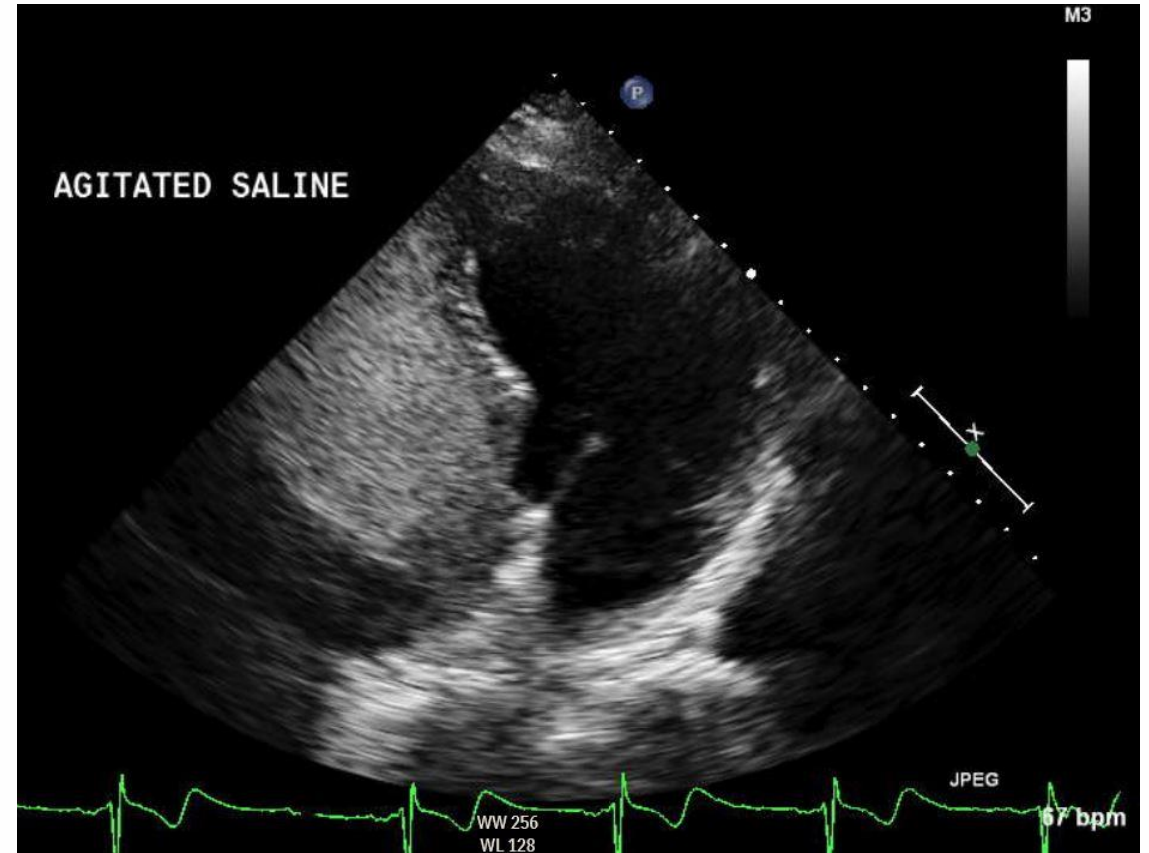


SCAI

Society for Cardiovascular
Angiography & Interventions

Follow-Up

- At one month
 - Completed DAPT, continuing aspirin 81 mg daily for 6 months
 - Remained asymptomatic
 - TTE demonstrating no interatrial shunting



SCAI

Society for Cardiovascular
Angiography & Interventions

Question

- Which of the following findings on echocardiography is most consistent with primarily intracardiac R-to-L shunting?
 - a. On bubble study, appearance of bubbles in left atrium within 3 cardiac cycles
 - b. On bubble study, appearance of bubbles in left atrium after 5 or more cardiac cycles
 - c. Elevation in PASP
 - d. Presence of PFO on TEE



SCAI

Society for Cardiovascular
Angiography & Interventions

Correct Answer

- Correct answer is appearance of bubbles in left atrium within 3 cardiac cycles
 - Early appearance consistent with intracardiac shunting, while late appearance (>5 beats) occurs in the setting of extracardiac causes
- TEE is useful in characterizing size of anatomical defect such as a PFO, but most PFOs occur without R-L shunting



SCAI

Society for Cardiovascular
Angiography & Interventions

Agrawal A, Palkar A, Talwar A. The multiple dimensions of Platypnea-Orthodeoxia syndrome: A review. *Respir Med.* 2017;129:31-38.
doi:10.1016/j.rmed.2017.05.016

Conclusions and Learning Points

- Medical therapies to reduce R-L shunting in the setting of platypnea-orthodeoxia syndrome can be trialed prior to consideration of PFO closure
- In addition to elevation in pulmonary pressures, anatomical changes secondary to intrabdominal/intrathoracic surgeries have been hypothesized to be a contributing factor in the development of platypnea-orthodeoxia syndrome
 - Post-op changes in direction of venous return relative to the interatrial septum



SCAI

Society for Cardiovascular
Angiography & Interventions

Agrawal A, Palkar A, Talwar A. The multiple dimensions of Platypnea-Orthodeoxia syndrome: A review. *Respir Med.* 2017;129:31-38. doi:10.1016/j.rmed.2017.05.016

75-WORD CASE SUMMARY

In the space below, write a brief (75-word-maximum) case summary to be posted with your case on [scai.org](https://www.scai.org).

A 64-year-old Caucasian male hospitalized for surgical management of metastatic sigmoid colon adenocarcinoma developed acute hypoxic respiratory failure postoperatively. Right-to-left shunting through a large PFO was identified via echocardiography, with suspicion for elevations in pulmonary pressures versus anatomic distortion related to surgery resulting in right-to-left shunting through the PFO. Attempts to reduce right-sided heart pressures to minimize shunting were ultimately unsuccessful in eliminating supplemental oxygen requirements. Hypoxia immediately resolved following percutaneous PFO closure.



This slide will be removed before publication.