



1

Case reports always have something unusual to learn!

- Choose interesting cases to share out of almost 400?!
- Many firsts are published in CASE
- Case reports are how it all begins... then trials... then new standard of care!
- Sharing unfortunate (and fortunate) experiences are incredibly important and often have the best lessons.

2

Case 1: What else could go wrong?

- LVAD pt with HF and severe AR, due to what appeared to be a ruptured suture

WHEN DOES IT BE THE PROBLEM?
Subacute Aortic Root and Valve Thrombosis as a Complication of Transcatheter Aortic Valve Replacement in a Left Ventricular Assist Device Patient: From One Problem to the Next!

Figure 1 Transesophageal image of the aortic valve in the transgastric view. Biplane imaging is utilized to visualize the aortic valve (blue asterisk) and mitral valve (red asterisk) in end diastole. The bottom panels demonstrate color Doppler of the same biplane view with significant AR noted.

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Case 1: What else could go wrong?

- Echo displayed laminar flow in the inflow cannula.
- Choices for treatment:
 - Amplatzer device,
 - TAVR or
 - surgery
- TAVR resulted in trivial PVL, and much improved hemodynamics
- 1 week later, sustained VT required defibrillator implant and amiodarone

WHEN DOES IT BE THE PROBLEM?
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Figure 2 Transesophageal echocardiogram view showing the inflow cannula of the LVAD with laminar flow.

Figure 3 Diastolic frame from deep transgastric view taken 15 minutes after valve implantation. Significant valve stable in position and minimal paravalvular leak (PVL) noted. LV, Left ventricle.

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Case 1: What else could go wrong?

- 10 days later, more VT, CT angio reveals complete thrombosis of the TAVR and SoV, without coronary artery occlusion
- Probable cause was thought to be coronary embolism

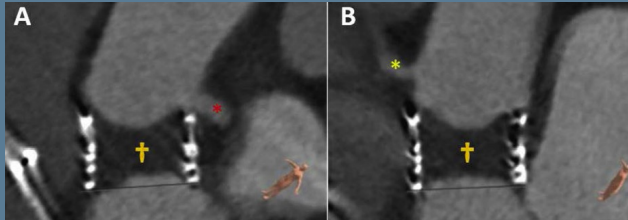


Figure 4 (A) Postprocedural computed tomography (CT) shows the ostium and proximal portion of the left main coronary artery (red asterisk) and significant thrombus within the implanted transcatheter aortic valve (orange dagger). (B) Postprocedural CT shows the ostium and proximal portion of the right coronary artery (yellow asterisk).

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Case 1: What else could go wrong?

- 21 days after TAVR, with increased episodes of VT, underwent successful transplantation.
- Frequency of aortic valve opening is thought to have contributed to thrombus formation.

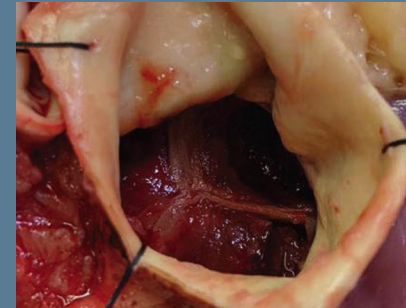


Figure 5 Thrombosed transcatheter aortic valve seen at the time of cardiac transplantation.

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Case 1: What else could go wrong?

Highlights:

- AR more common with prolonged continuous-flow LVAD
- Associated with increased risk of rehospitalization and mortality
- Is progressive, and echo helps recognize worsening
- TAVR for severe AR in LVAD patients is growing with generally favorable outcomes.

Read all about it in CASE

WHEN LVOT IS THE PROBLEM

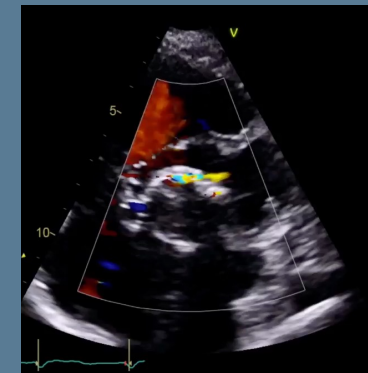
Subacute Aortic Root and Valve Thrombosis following Transcatheter Aortic Valve Replacement in a Left Ventricular Assist Device Patient: From One Problem to the Next

Srinie Benkhan, AGACNP-BC, Anwarulla Lala, MD, George Dangas, MD, PhD, Gilbert H. U. Tang, MD, MSc, MBA, Anshu Anzures, MD, Noah Moss, MD, and Stamatios Lerakis, MD, PhD, New York, New York

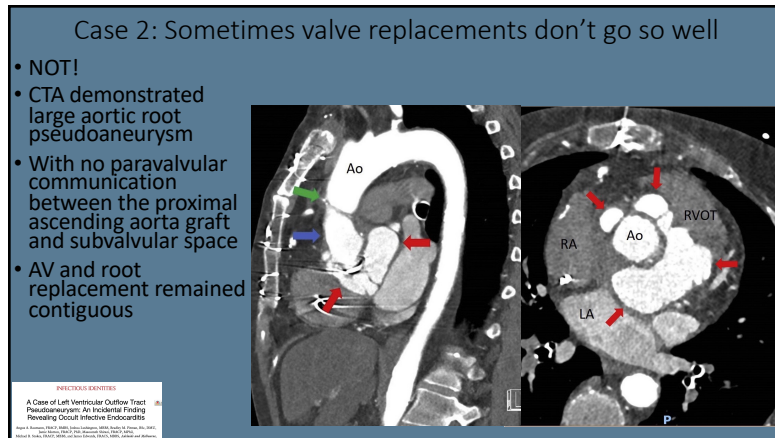
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Case 2: Sometimes valve replacements don't go so well

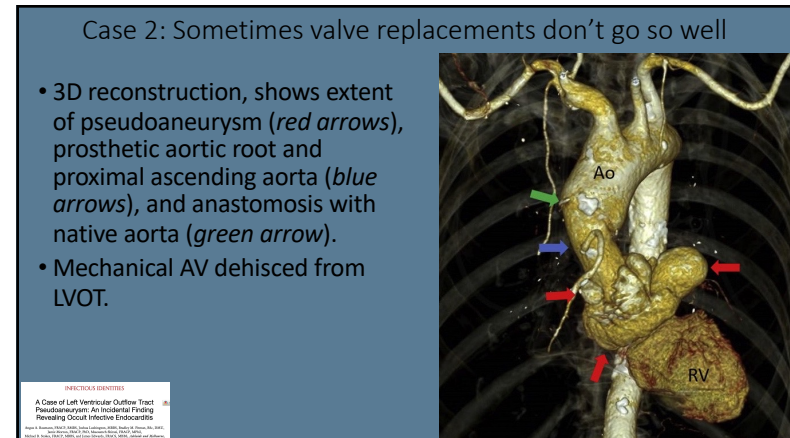
- Redo AVR with root replacement complicated by a VSD requiring repair
- TTE shows turbulence suspicious for PVL?



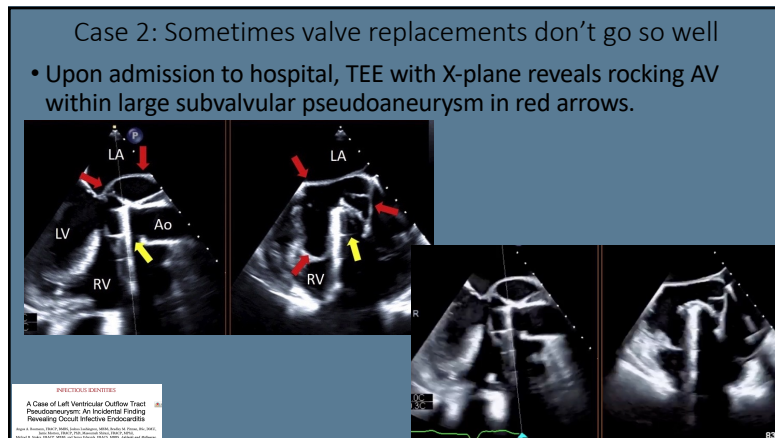
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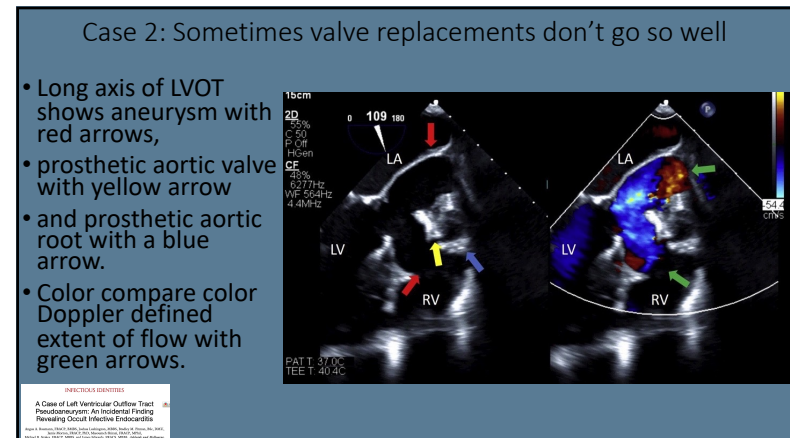
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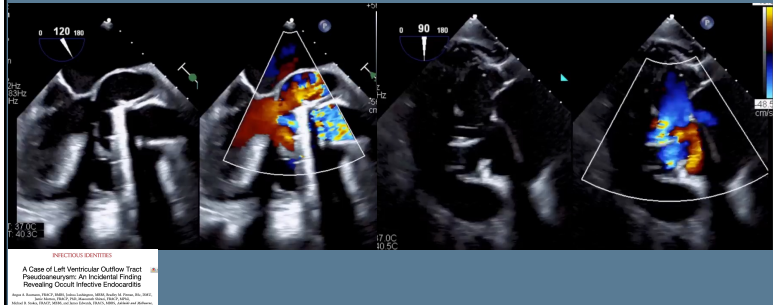
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Case 2: Sometimes valve replacements don't go so well

- Prosthetic valve was well seated in the graft, with only trivial PVL between the valve and root prosthesis, **all contained within the pseudoaneurysm.**



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Case 2: Sometimes valve replacements don't go so well

- Pt underwent another successful root replacement and repair of pseudoaneurysm.
- Cultures of aneurysm, LVOT, and old prosthetic valve were positive for *Enterococcus*.
- Tissue from LVOT also grew *Aspergillus*, felt to be nonpathogenic.

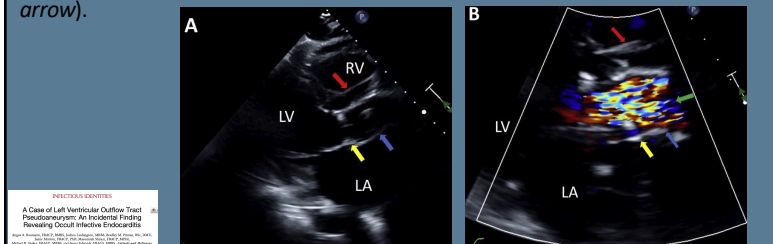


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Case 2: Sometimes valve replacements don't go so well

TTE shows a well-seated prosthetic aortic valve (yellow arrow), within the new prosthetic aortic root (blue arrow). The potential space created by the sealed pseudoaneurysm is visible (red arrow).

Color Doppler shows flow (green arrow) within the prosthetic aortic valve and root (yellow and blue arrows) but not within the old pseudoaneurysm (red arrow).



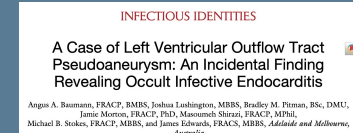
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Case 2: Sometimes valve replacements don't go so well

Highlights

- LVOT pseudoaneurysm is rare but important complication of cardiothoracic surgery with mortality of about 20%.
- Can present insidiously, often detected by surveillance echo.
- Anatomy can be difficult to understand and is shown best with multi-modality imaging.
- Most commonly associated with previous cardiothoracic surgery, infection and MI.
- Surgery remains preferred treatment. Percutaneous occlusion may rarely be considered.

Read all about it in CASE



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Case 3: Have you ever thought of this?

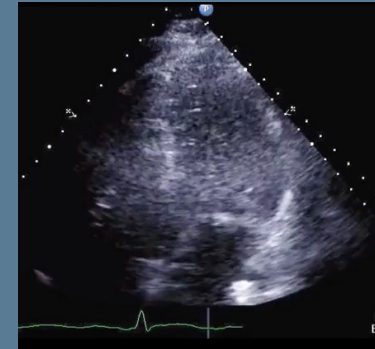
- Pt in ICU... coughing... can't lay back... can't really talk (due to incessant coughing)
- Echo is ordered for shortness of breath (don't you just love that?)
- With no time to inquire about the pt's history, the sonographer is sent to perform a stat echo...

ABLATION COMPLICATIONS
Detection of an Atrioesophageal Fistula on a Transthoracic Echocardiogram

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Case 3: Have you ever thought of this?

- Given very little information, the detective rises to the challenge, which could have easily had disclaimer: exam was not possible due to pt coughing, etc.
- Pt sitting upright, constantly moving, unable to speak, with probe held tightly to chest, and bubbles suddenly appearing, then quickly disappearing in LV.
- No bubbles were seen on right side!

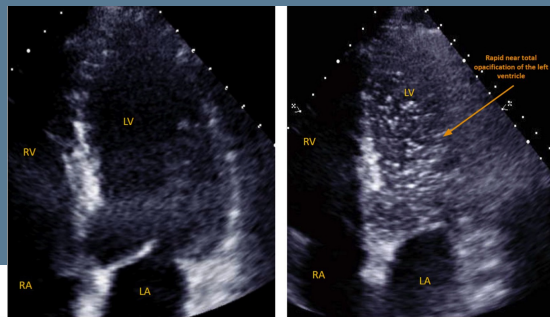


ABLATION COMPLICATIONS
Detection of an Atrioesophageal Fistula on a Transthoracic Echocardiogram

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Case 3: Have you ever thought of this?

- A significant number of bubbles were spontaneously opacifying most of the LV whenever the pt coughed, filling the LV in a basal-to-apical fashion.



ABLATION COMPLICATIONS
Detection of an Atrioesophageal Fistula on a Transthoracic Echocardiogram

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Case 3: Have you ever thought of this?

- With no bubs on the right, this ruled out bubbles from the venous side.
- It was also important to make sure this was not a case of transpulmonary shunting through an av fistula.
- To narrow down the differential, machine was set up to capture retrospectively, increase in the number of loops, then waited for pt to have another coughing fit.
- Again, no bubs in the LA or right side.



ABLATION COMPLICATIONS
Detection of an Atrioesophageal Fistula on a Transthoracic Echocardiogram

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Can you guess what this is?

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Case 3: Have you ever thought of this?

- Turns out the pt had pulmonary vein isolation for afib 3 weeks prior.
- PV isolation is a type of cardiac ablation that uses heat or cold energy to create tiny scars in the heart to block abnormal electrical signals to restore a normal heartbeat.
- 2-weeks prior, at clinic follow-up, the pt reported an irritating cough which was attributed to a respiratory origin.
- When the pt showed up in the ER 3-week later, his cough was incessant, and he was unable to speak. Brain CT revealed a small area of subarachnoid hemorrhage, which was attributed by the neurology team to his excessive coughing on a background of anticoagulant therapy.
- This time the pt was admitted to ICU, warfarin withheld, and was started on broad-spectrum antibiotics as the echo was ordered.

ABLATION COMPLICATIONS
Detection of an Atrioesophageal Fistula on a Transthoracic Echocardiogram

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Case 3: Have you ever thought of this?

- Echo findings suggested communication with either the esophagus or the bronchial tree.
- Pt's clinical situation quickly deteriorated including a remarkable decline in consciousness, presumably secondary to cerebral air emboli.
- Pt was placed on mechanical ventilation in which endotracheal tube was purposefully placed in right main bronchus to avoid further damage in case a fistula between LA and airways existed.
- Endoscopy showed a large clot attached to the anterior aspect of the distal esophageal wall, highly suggestive of Atrioesophageal fistula (AEF).
- A covered stent was immediately placed over the fistula's entry point.

ABLATION COMPLICATIONS
Detection of an Atrioesophageal Fistula on a Transthoracic Echocardiogram

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Case 3: Have you ever thought of this?

- Despite all efforts, the pt's condition worsened and he arrested, which was thought to be the result of a coronary artery air embolization.
- Autopsy clearly delineated a fistula measuring 3 mm in diameter connecting the esophagus to the LA.

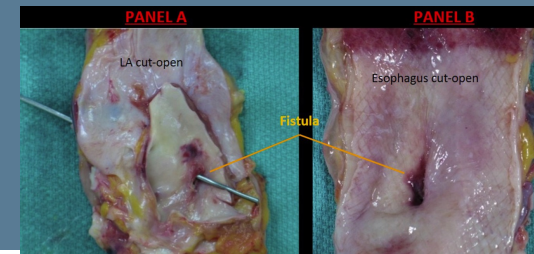


Figure 2 Postmortem autopsy study clearly defining the fistula with its atrioesophageal path. (A) Left atrium (LA) cut open with an inserted metallic rod clearly pinpointing the path of the fistula toward the esophagus (not seen) on the back. (B) Esophagus cut open, showing the entry point of the fistula. Also note the imprints on the esophageal mucosa from the previously present stent.

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Case 3: Have you ever thought of this?

Highlights

- AEF is a rare complication of AF ablation associated with high mortality.
- There is no typical clinical presentation.
- High clinical suspicion for AEF should be maintained after ablation.

Remember to **check the pt's chart before the study** and of course to...

Read all about it in CASE

ABLATION COMPLICATIONS

Detection of an Atrioesophageal Fistula on a Transthoracic Echocardiogram

Clara I. Angulo, BS, RDCS, Kinan Carlos El Tallawi, MD, Eleonora Avenatti, MD, Anakara Sukumaran, MD, Miguel Quinones, MD, and Sherif F. Nagueh, MD, *Houston, Texas*

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Case 4: Another ablation complication

- 6 yo with unrepaired Ebstein's anomaly presented with incessant VT unresponsive to antiarrhythmic meds and cardioversion.
- EP mapping revealed two reentrant VT pathways in the atrialized RV adjacent to TV annulus.
- Initially they could not reach the area due to the distance to the RV, so a larger catheter was deployed and pt was successfully converted to sinus rhythm, with no recurrent VT.
- However, at end of the procedure, she was noted to have multiple desaturation events which improved with inotropic support and blood transfusion.

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Case 4: Another ablation complication

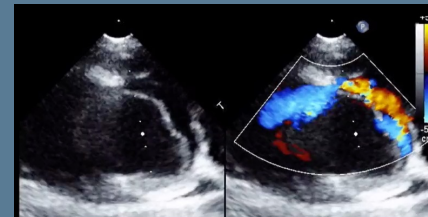
- TTE was performed to further investigate and revealed what at that time was thought to be a fibrin strand or thrombus that had formed over the catheter.



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Case 4: Another ablation complication

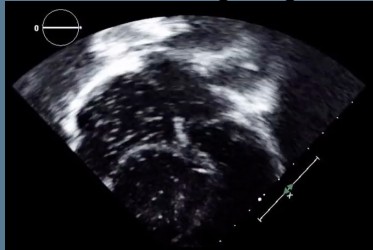
- Intracardiac dissection was considered, but the pt was stable, so no intervention was recommended.
- Pt spent the night in cardiac ICU for observation and continued to have episodic desaturation that progressed to persistent desaturation and hypotension.
- TTE imaging revealed a hypoechoic fluid-filled "cyst" in the atrialized RV above the TV with color Doppler showing flow around the fluid-filled cyst, but not in it.



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Case 4: Another ablation complication

- Agitated saline showed contrast entering the cyst, indicating direct communication with the cardiac cavity.
- Diagnosis of an atrial dissection was made. The dissection flap was obstructing TV inflow, resulting in decreased pulmonary blood flow and progressive hypoxemia from R-L shunting through an ASD.



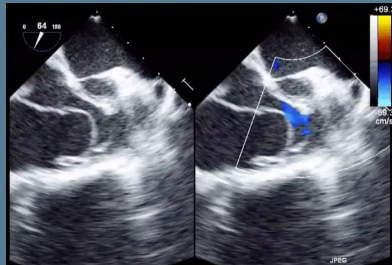
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Did you know an EP study could cause a right atrial dissection?

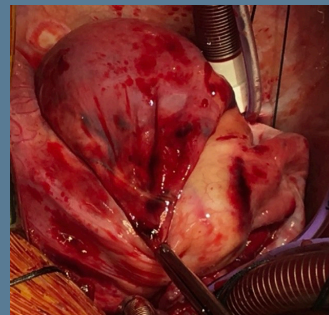
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Case 4: Another ablation complication

- In the OR, TEE confirmed the diagnosis.
- A large hematoma within the wall of the atrialized RV was found.



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Case 4: Another ablation complication

Highlights

- Right atrial dissection is a potentially life-threatening complication after ablation.
- Hemodynamic instability may occur and rapidly progress.
- Agitated saline contrast echo may help diagnose intracardiac dissection.

Read all about it in CASE

CATH LAB CONUNDRUMS

Postablation Right Atrial Dissection
in Ebstein's Anomaly

Fatemat Hassan, MBBCh, Akash Patel, MD, Vidyula Mohan Reddy, MD,
and Hythem Nawayrou, MBBCh, San Francisco, California

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Ahhh, the power of ultrasound...

Do you realize just how powerful this tool really is?

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Case 5: What?!

- 13-mo with hypoplastic left heart syndrome, a small ASD and a PDA
- Throughout one year, had multiple operations and procedures including septostomy, septectomy, rerouting great vessels, PA banding then unbanding, and ductal stents, then resection of those stents.

Successful Recanalization of Thrombotic Occlusion in Pulmonary Artery Stent Using Sonothrombolysis

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Case 5: What?!

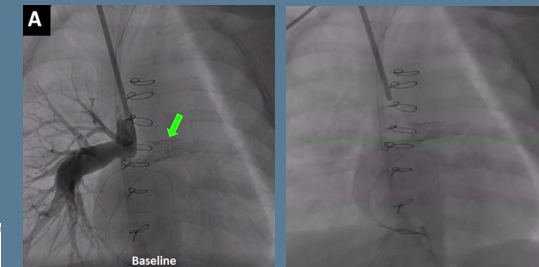
- After the final surgery at one-year postop day-one, developed hypotension and bradycardia.
- Urgent echo demonstrated absence of flow in the left PA, at the exact stent location.
- Pulmonary angiography confirmed a left PA embolism and received a 2nd stenting, improving oxygenation and hemodynamic recovery.
- Unfortunately, by the 23rd postop day, pt once again developed severe hypotension and hypoxemia with O2 sats of 61%.

Successful Recanalization of Thrombotic Occlusion in Pulmonary Artery Stent Using Sonothrombolysis

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Case 5: What?!

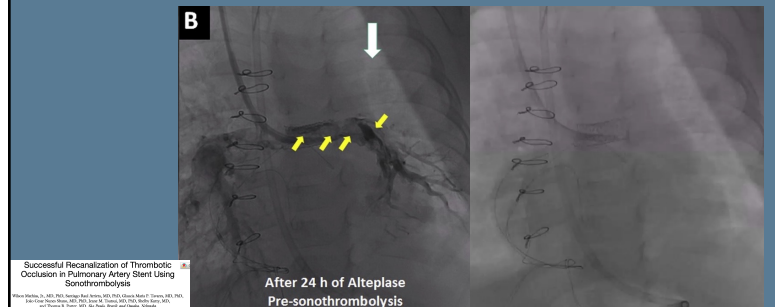
- Repeat cath detected recurrent PA stent thrombosis and multiple thromboemboli to left pulmonary branches.
- Subsequent contrast injection in the main PA demonstrated complete occlusion of left PA branch (*green arrow*).



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Case 5: What?!

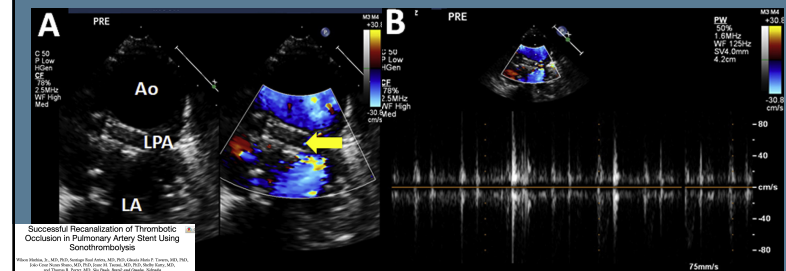
- Following day, selective LPA angiography demonstrated persistence of occlusion of all lobe branches and extensive thrombi.



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Case 5: What?!

- 2D and color Doppler images demonstrate absence of flow in the left PA, where the stent was placed.
- PW Doppler confirms absence of signal with the sample volume placed in the left main PA.



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Case 5: What?!

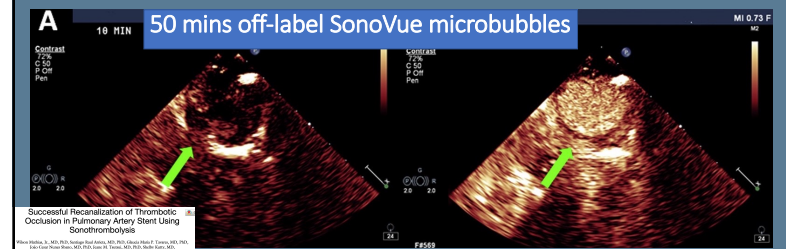
- After obtaining compassionate use consent, image-guided sonothrombolysis attempted to recanalize the pulmonary arteries and microcirculation using high-mechanical index pulses from a transthoracic transducer with use of commercially available microbubbles.



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Case 5: What?!

- Images were acquired immediately after, and 2 sec after microbubble destruction by high-mechanical index impulses



40

Case 5: What?!

- 1.7 MHz, MI 1.3 and 20- μ sec pulse duration was applied in 2nd left intercostal space, with beam directed to PA, sweeping the upper left pulmonary lobe and superior part of inferior left pulmonary lobe, during IV bolus injections of microbubbles (0.1 mL each injection) followed by saline injection.
- Total dose of microbubbles used was 6 mL.

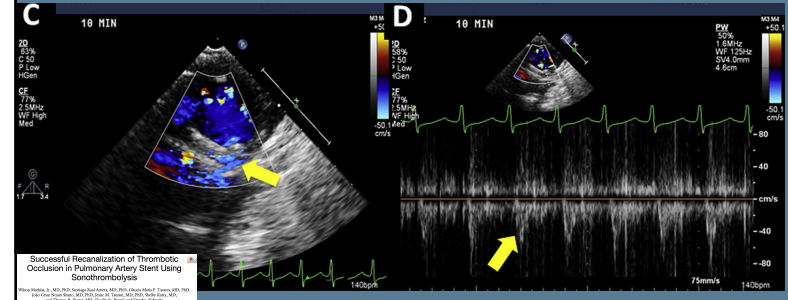


Successful Recanalization of Thrombotic Occlusion in Pulmonary Artery Stent Using Sonothrombolysis

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Case 5: What?!

- After 50 mins, 2D and color Doppler images demonstrate signs of left PA recanalization (yellow arrows).

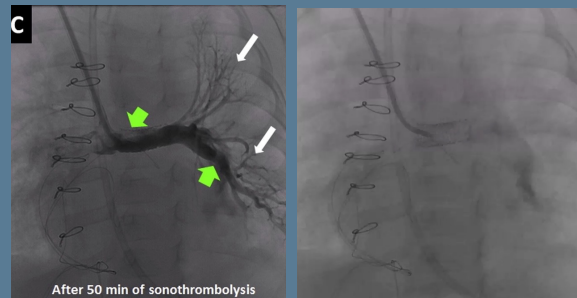


Successful Recanalization of Thrombotic Occlusion in Pulmonary Artery Stent Using Sonothrombolysis

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Case 5: What?!

- Angiography also demonstrated flow to main PA branch and periphery of lung, although residual thrombi were evident in distal vasculature.



Successful Recanalization of Thrombotic Occlusion in Pulmonary Artery Stent Using Sonothrombolysis

After 50 min of sonothrombolysis

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Case 5: What?!

- Oxygenation went from 64% at baseline, to 78% after sonothrombolysis.
- Angiographic patency in the left PA and branches were evident after sonothrombolysis.
- The child became hemodynamically stable with improved saturation.
- Unfortunately, on the 25th day after sonothrombolysis, she was diagnosed with *Pseudomonas aeruginosa* systemic infection, leading to a septic state that was difficult to manage.
- The child presented an irresponsive cardiac arrest by pulseless electrical activity and died.

Successful Recanalization of Thrombotic Occlusion in Pulmonary Artery Stent Using Sonothrombolysis

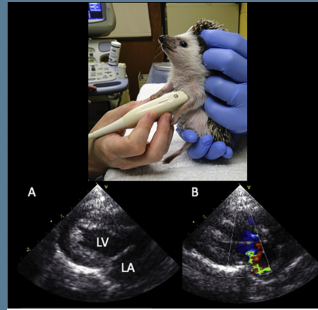
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Remember you saw it here first!

• Along with a bunch of other firsts....

- 3D ICE Mitraclip...
- 3D ICE PVL
- 3 Different Types of Takutsubo in one pt
- Animal transmission case rise in Echinococcus
- Animal diagnostics and therapy: we have a lot more in common then previously realized!
- Amyloid patterns are NOT just apical sparing
- AS gradients might be brachial cephalic stenosis detected by Doppler
- Strain can be used in a zillion ways and soon to become standard of care... GET READY!
- THERE IS NO SUCH THING AS ALWAYS OR NEVER...ALWAYS EXPLORE!

Yes, this is a hedgehog!

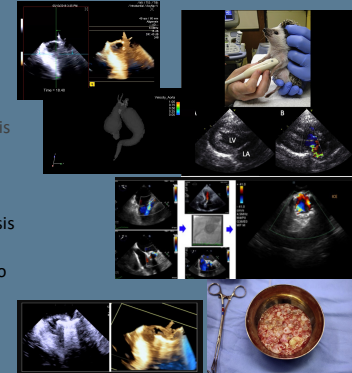


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Remember you saw it here first!

• Along with a bunch of other firsts....

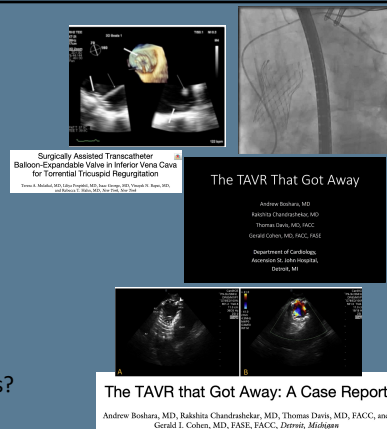
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Benefits of CASE

- Wild new world of experiences
- Download pptx
- Search for diseases
- Search for procedures
- Learn new tricks
- Download movies
- Share your experiences
- Read all about it!
- Nothing but cool stuff!
- Where else could you find all this?



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Michigan Society of Echocardiography

CASE: Under my watch

Karen G. Zimmerman BS, ACS, RDCS, RVT, FASE
CASE Founding Editor-in-Chief



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