#ASEchoJC Twitter Chat
Thursday, November 2, 2023 – 8 PM ET

- 2023 ShowCASE Winner and Finalist
  - **Extrinsic Circumflex Coronary Artery Compression and Occlusion by Mycotic Aneurysm of Left Aortic Sinus**
  - **Five-Chambered Heart With Double-Chambered Left Ventricle Diagnosed by Multimodality Imaging**

Authors

- Ramesh C. Bansal, MD, FASE (@bansalmd1)
- Nathan Marzlin, MD (@NMarzlin)

Moderators:

- Enrique Garcia-Sayan, MD, FACC, FASE (@EGarciaSayan)
- Vincent L. Sorrell, MD, FASE (@VLSorrellImages)

**Introduction and Welcome:**

@EGarciaSayan: 🎉 Welcome to tonight’s #ASEchoJC on X!

🌟 2 @CASEfromASE discussions with authors @bansalmd1 & @nmarzlin & co-moderated by @CASEfromASE EiC @VLSorrellImages


👉 Remember to use #ASEchoJC in all Posts (Tweets)
Q1: Which structures can cause myocardial ischemia due to extrinsic compression of the left main coronary artery?

A1 Notable Responses:

@EGarciaSayy: 🌟 Question 1: (case #1 http://bit.ly/3FJ2a1m): Which structures can cause myocardial ischemia due to extrinsic compression of the left main coronary artery?

@Siwa23288585: 🍔 PA dilation with PH

먹자 ALPACA 🐐

 успешный congenital aortic sinus of Valsalva aneurysms (SVAs)

and so on 😊

@VLSorrellImages: Great Question:

- Malignant inter-arterial course
- Dilated main PA (pulmonary hypertension)
- Congenital &/or pseudo-aneurysms of the SOV
- Submitral LV aneurysm
- MAIVF aneurysm from endocarditis

@bansalmd1:

**Q 1: Answer**

- Severe pulmonary artery dilation in patients with pulmonary hypertension
- Anomalous origin of left coronary artery from right aortic sinus with interarterial or between course (ALCA-R, B)
- Congenital aortic sinus of Valsalva aneurysms (SVAs)
- Aortic pseudoaneurysm following ascending aortic replacement surgery
- Submitral left ventricular aneurysms
- Mycotic aneurysm of mitral-aortic intervalvular fibrosa (MAIVF)
- Mycotic aneurysm of left aortic sinus of Valsalva

@purviparwani: Which structures can cause myocardial ischemia due to extrinsic compression of the left main coronary artery?

@EGarciaSayy: @bansalmd1 describes various cardiac structures that can cause myocardial ischemia due to extrinsic compression of the left main coronary artery

@bansalmd1:
• Here is an example of severe pulmonary artery dilation in patients with pulmonary hypertension causing LM compression:

**Case 1**

@bansalm1:

**Case 1: Dilated MPA, PH, LM compression**
- 37-year-old man, ASD, ES, angina. Angiogram: LM compression. Treated with IVUS guided LM stent

![Image: Before and After stent](Image)

Cool et al. BMC Cardiovascular Disorders 2022; 22:89

@bansalm1:

**Severe Pulmonary artery dilation and hypertension (PH) and causing LM compression**
- First described in 1957 by Corday et al. (Transactions American College of Cardiology 1957; 7: 93-103)
- Dilated MPA compresses the LM, most group 1, can in others
- Incidence: larger studies report in 19-40 % with angina
- Diagnosis by Echo, CT, coronary angiogram and IVUS
- Higher compression risk with following CT criteria:
  - PA diameter > 40 mm, ratio of the MPA and aortic root ≥ 1.5, and LM take-off angle ≤ 45° (between the longitudinal line of the LMCA and orthogonal line of the aortic valve)
- An isolated LM ostial lesion is a class II recommendation for PCI, more complex lesions may be best treated with CABG

@bansalm1:

**BMC Cardiovascular Disorders**

Eisenmenger syndrome with left main compression:

Background Left main coronary artery disease secondary to pulmonary artery compression relate...

@bansalm1:

• Here is an example of anomalous LM from R sinus with interarterial or between intramural course (ALCA-R, B intramural)

**Case 2**

@bansalm1: 10.1148/rg.2017160124

**Case 2: TTE, ALCA-R, B intramural**
- 16-year-old male, chest pain and syncpne. TTE: SAX view with color shows abnormal flow in the narrow ostium of ALCA-R, B

![Image: TTE view](Image)

**Case 2: CCTA, ALCACA-R, B intramural**
- 16-year-old male, chest pain and syncpne. CT shows abnormal origin of LM from R sinus and between the arteries (B) or interarterial course

![Image: CCTA view](Image)
@VLSorrellImages: Ramesh, I remember that excellent slide from your ShowCASE presentation during the 2023 ASE annual scientific sessions. Congrats!

@DavidWienerMD: #ShowCASE was a special session during @ASE360 2023 Scientific Sessions showcasing case reports and judged by experts. Another reason to join us in Portland in June for #ASE2024

@VLSorrellImages: We learned so much during ShowCASE 23... hope to see you next year for ShowCASE24! Better yet... submit your CASE today to get invited to participate and possibly win the COY! https://cvcasejournal.com/content/authorinfo

@VLSorrellImages: Nice examples of the coronary origins with TEE:
Here is an example of Submitral LV aneurysm causing LM compression

Case 3

19-year-old girl, HF. TTE: submitral aneurysm, LM compression. Had surgical repair and MVR

Kumar P et al., Journal of The Association of Physicians of India 2010. 06 : 00-01
**Question 2:**

**A2 Notable Responses:**

@EGarciaSayan: ✭ Question 2: What are some of the subaortic complications of aortic valve endocarditis?

@bansalm1:

**Aortic Valve, Sub-aortic, peri-aortic Anatomy**

**Aortic Valve Endocarditis (AVE):**
Infected AR jet can strike the subaortic and peri-aortic structures and produce

- **Sub-aortic**
- **Peri-aortic** complications of endocarditis

**AVE: Subaortic complications (MAIVF aneurysm, mitral valve aneurysm)**

**AVE: Sub-aortic and peri-aortic complications**

- **Sub-aortic:** Mitral-aortic intervalvular fibrosa (MAIVF), anterior mitral leaflet (AML), chords, ventricular septum
- **Peri-aortic:** aortic ring, aortic sinuses of Valsalva
- Involvement of these structures can cause abscess, mycotic aneurysms, fistula
- This has been subject of multiple publications since 1983 (examples in next three images)

@bansalm1: 10.1161/01.cir.86.2.353

https://ahajournals.org/doi/pdf/10.1161/01.CIR.67.4.930

10.1111/j.1540-8175.1990.tb00399.x

https://doi.org/10.1016/S0735-1097(10)80082-8

10.1161/01.cir.86.2.353

sciencedirect.com

Left ventricular outflow tract to left atrial communica

Infection of the mitral-aortic intervalvular fibrosa occurs most commonly in association with infectiv...
CASE allows you to search for reports by disease. Here are the 133 search results for AV endocarditis:

https://cvcasejournal.com/action/doSearch?type=quicksearch&text1=aortic+valve+endocarditis&field1=AllField

@EGarciaSayan: @CASEfromASE editor-in-chief @VLSorrellImages demonstrates the journal’s searchable case and image database. A rich library of complex pathology that continues to grow.

@bansalm1: 10.1016/j.echo.2004.01.002
10.1016/s0894-7317(14)80068-0

https://doi.org/10.1016/j.case.2021.11.009

AVE: R aortic unruptured SVA and R SVA rupture into RV

AVE: Sub-aortic and peri-aortic complications

Aortic valve Endocarditis (AVE):
- A wide spectrum of these complications has been reported in the last several decades
- A summary of these complications was published (Case June 2022- next two slides)


AVE: Peri-aortic Complications

@EGarciaSayan: @bansalm1 describes various subaortic complications of AV endocarditis. Also, see the fantastic Figure 1 from the case!
AV Endocarditis: Sub-aortic Complications

MAIVF aneurysm with compression of anomalous CX

- An example of a case of myotic aneurysm of mitral-aortic intervalvular Fibrosa (MAIVF) causing LM/ circumflex(CX) compression

Case 4: MAIVF aneurysm, compression of anomalous CX

68-year-old female, no surgical AVR, due to IE using St. Jude Trifecta bioprosthesis at OSH in S/2015. TTE SAX view 5 year later, severe bioprosthetic central AR (PAR), MAIVF aneurysm (AN) between yellow arrows, expands in systole and smaller in diastole

Case 4: MAIVF aneurysm, compression of anomalous CX

68-year-old female, no surgical AVR due to IE using St. Jude Trifecta bioprosthesis at OSH in S/2015. TTE bioprosthetic central AR (PAR), MAIVF aneurysm (AN) between yellow arrows, expands in systole and smaller in diastole

Case 4: MAIVF aneurysm, compression of anomalous CX

68-year-old female. No surgical AVR due to IE using St. Jude Trifecta bioprosthesis at OSH in S/2015. TEE 5 year later. SAX view: large MAIVF aneurysm (AN) between yellow arrows, expands in systole and smaller in diastole. White arrow shows communication to LGOT
Case 4: MAIVF aneurysm, compression of anomalous CX

* 68-year-old female, h/o surgical AVR due to IE using St. Jude Triflecta bioprosthesis at OSH in 9/2015, CT 5 years. Panel A coronal image shows bioprosthetic aortic valve, MAIVF aneurysm (An-arrow). Panel B shows anomalous CX from right sinus coursing retroaortic in the wall of aneurysm

Case 4: MAIVF aneurysm with compression of anomalous CX by angiography

@purviparwani: Nice example of #Echofirst features of a mycotic aneurysm of the Left Ventricular Outflow Tract Caused by Perforation of Mitral-Aortic Intervalvular Fibrosa

See the schematic showing systolic expansion and diastolic collapse. Showing this live on the TEE helps determine the pathophysiology of the lesion. https://ahajournals.org/doi/pdf/10.1161/01.CIR.67.4.930
Question 3:

What are some of the peri-aortic complications of aortic valve endocarditis?

A3 Notable Responses:

@E GarciaSayan: Question 3: What are some of the peri-aortic complications of aortic valve endocarditis?

@E GarciaSayan: Figure 2 from the case by @bansalmd1 illustrates peri-aortic complications of AV endocarditis

@bansalmd1: https://doi.org/10.1016/j.case.2021.11.009

Case 5: Circumflex compression by left SVA

Case 5: AVE, flail L cusp, severe AR by TTE

Case 5: AVE, AR, Left SVA by TEE

Case 5: AVE, Left SVA, normal LM, CX flow
**Case 5: AVE, L SVA, no compression by CT**
- 42-year-old man, ESRD, Aortic valve endocarditis (AVE) due to MSSA, HF. CT shows left SVA in close proximity to LM. Circumflex (CX) courses over the SVA but no compression.

![Image of CT scan showing close proximity of CX to SVA](image_url)

**Case 5: Left SVA with AVE-surgery**
- 42-year-old man, AVE due to MSSA, HF, s/p surgical AVR with #21 On-X, pericardial patch repair of SVA. Excised AV specimen on left. Post-op TTE: normal prosthetic valve function, intact repair of SVA (arrows)

![Image of surgical repair of SVA](image_url)

**Case 5: Left SVA with AVE, s/p AVR, Readmitted**
- Re-admitted 3 month later with SOB. Trop-T increased 4.8 ng/mL, ECG STEMI, BC + for Enterococcus, myocytic left SVA, causing extrinsic compression of LCx, MI. Aortico-LV fistula. Echo findings confirmed, had Bentall, MVR for FMR

![Image of ECG and TTE findings](image_url)

@bansalmd1:

**Case 5: Left SVA, CX compression**
- Re-admitted 3 month later with SOB, lateral STEMI, angiogram: LM compression, occluded CX

![Image of angiogram showing CX compression](image_url)

**Case 5: Left SVA, CX compression, lateral MI**
- Re-admitted 3 month later with SOB, lateral STEMI, angiogram: LM compression, occluded CX, BC + for Enterococcus. TTE: lateral MI, TEE: L SVA causing LM compression, occluded CX

![Image of angiogram and TTE findings](image_url)

**Case 5: Left SVA, CX compression, lateral MI, and aortico-LV fistula**
- Re-admitted 3 month with lateral STEMI, angiogram: LM compression, occluded CX, BC + for Enterococcus. TTE: lateral MI, TEE: L SVA-MAVF-LV fistula

![Image of angiogram and TTE findings showing fistula](image_url)

@VLSorrellImages: Has anyone stented a stenotic coronary from an extrinsic-compression etiology?
@CASEfromASE
Question 4:

@EGarciaSayan: ❇️ Question 4 What are the causes and predominant location of aneurysms of the sinus of Valsalva?

@EGarciaSayan: ▲ Most common is right SOVA (~70%) rupturing into RV, and non-coronary SOVA (~25%) rupturing into RA. Extracardiac rupture is rare

▲ Dx by #EchoFirst (TTE + TEE) > 90% yield. Add #YesCCT & #WhyCMR when needed

#ASEchoJC

Aortic Sinus of Valsalva Aneurysm (SVA):
Etiology, location,

- Etiology:
  - Congenital
  - Acquired: IE, trauma, surgical, trauma, Takayasu
- Location:
  - RSVA 75-80%, NSVA 20%, LLSVA < 2%
  - Rupture site: RSVA into RV (70%), into RA (30%)
    NSVA into RA (90%), into RV (10%)
    LLSVA into LA, LV

Aortic SVA: Site of origin, rupture

159 patients with ruptured SVA had surgery (yr 2006-12)

- Site of origin:
  - RSVA = 122 (78%), NSVA = 35 (22%), LLSVA = 2 (1%)
- Site of rupture:
  - RSVA (T 122): 85 (70%) into RV; 36 (30%) into RA; 1 (1%) into LV
  - NSVA (T 35): 31 (89%) into RA; 4 (11%) into RV
  - LLSVA (T 2): 2 (100%) into LA
- VSD: 77/159 (48%), supracristal, membranous

@bansalm1 describes causes and predominant location of aneurysms of the sinus of Valsalva.

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### Aortic SVA: Location, classification

<table>
<thead>
<tr>
<th>Type</th>
<th>Location</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Origin of the LVOT to the middle segment of the aortic arch</td>
<td>Posterior and lower side</td>
</tr>
<tr>
<td>B</td>
<td>Origin of the LVOT to the middle segment of the aortic arch</td>
<td>Posterior and lower side</td>
</tr>
<tr>
<td>C</td>
<td>Origin of the LVOT to the middle segment of the aortic arch</td>
<td>Posterior and lower side</td>
</tr>
<tr>
<td>D</td>
<td>Origin of the LVOT to the middle segment of the aortic arch</td>
<td>Posterior and lower side</td>
</tr>
<tr>
<td>E</td>
<td>Origin of the LVOT to the middle segment of the aortic arch</td>
<td>Posterior and lower side</td>
</tr>
<tr>
<td>F</td>
<td>Origin of the LVOT to the middle segment of the aortic arch</td>
<td>Posterior and lower side</td>
</tr>
<tr>
<td>G</td>
<td>Origin of the LVOT to the middle segment of the aortic arch</td>
<td>Posterior and lower side</td>
</tr>
<tr>
<td>H</td>
<td>Origin of the LVOT to the middle segment of the aortic arch</td>
<td>Posterior and lower side</td>
</tr>
</tbody>
</table>


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### Aortic SVA rupture site and TTE image

TTE SAX image: Riva into RV, RA, NC SVA into RA or RV, LV SVA into LA, LV R SVA can be associated with subpulmonary or membranous and NC SVA can be associated with membranous VSD.

Hoey ET A et al. AJR 2010 194: W465-504

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@EGarcioSayan: @bansalm1 describes causes and predominant location of aneurysms of the sinus of Valsalva.
Question 5:

What are the clinical manifestations of sinus of Valsalva aneurysms?

A5 Notable responses

@EGarciaSayan: 🌟 Question 5: What are the components of a successful IE training program?

@EGarciaSayan:

▲ Presentation depends on sinus affected & relationship with adjacent structures

▲ Rupture into RA or RV or compression of RV inflow/ outflow ➔ RV Vol overload + RHF

▲ Rupture into LA ➔ RV Vol overload & LHF

▲ Can involve cond system, or cause endocarditis, thrombus

@kgzimmerman: A picture is always worth a thousand words, thank you CCF for these great images to help explain!

@DavidWienerMD: And a big H/T to @kgzimmerman one of the founding editors of @CASEfromASE

@EGarciaSayan: thank you @kgzimmerman for your comments. @CASEfromASE would not be what it is without you!

@kgzimmerman: Takes many eyes to make a TEAM! Thank you to all those who share these experiences and teach us all!
@VLSorrellImages: These are often zebras and require a high index of suspicion. Lately, we have been fooled by the initial appearance of tricuspid valve endocarditis... as the wind-sock aneurysm moves near the TV!

@EGarciaSayan: @VLSorrellImages highlights importance of having a high index of suspicion for ruptured SoV aneurysms

@bansalmd1:

Clinical manifestations of aortic SVA

- Frequently asymptomatic, incidental finding on imaging
- Associated lesions: VSD, AR, Coarctation, ASD, BAV
- Rupture into RA, RV, rarely LA, LV
- Coronary compression, RVOT / LVOT obstruction
- HF due to AR, VSD, rupture

@EGarciaSayan: @bansalmd1 describes the various clinical manifestations of sinus of Valsalva aneurysms. Often asymptomatic and incidental. High index of suspicion in cases of shunt, regurg lesions, coronary compression and HF.

@EGarciaSayan: @bansalmd1 reviews the clinical manifestations of sinus of Valsalva aneurysms

@bansalmd1: https://ncbi.nlm.nih.gov/pmc/articles/PMC101268/
@purviparwani: This Doppler profile showing rupture of sinus of Valsalva aneurysm into RA should be noted!

-> Doppler with rupture SOV will be Continuous.

-> almost 4m/s jet due to the pressure difference between RA and aorta

@iamritu: With SOV rupture into RA.

the Doppler shows continuous high velocity systolic and diastolic flow into RA (continuous pressure gradient b/w aorta & RA) #echofirst
@EGarciaSayan: @bansalmd1 demonstrates characteristic spectral Doppler pattern of ruptured SoV aneurysm. Continuous high-velocity flow with diastolic accentuation. Differentiate from characteristic biphasic pattern of VSD with predominant systolic flow. @iamritu shared this in a prior #ASEchoJC

@bansalmd1:

**Case 8: AVE, aortic NC SVA, rupture into RA**
- 29-year-old female, congenital non coronary (NC) SVA, rupture into RA. TTE with color flow and Doppler show high velocity systolic and diastolic continuous flow into RA

**Case 8: AVE, aortic NC SVA, rupture into RA**
- 29-year-old female, congenital NC SVA, rupture into RA. TEE with color flow and Doppler show high velocity systolic and diastolic continuous flow into RA

**Case 8: S/p surgical repair of aortic NC SVA that had ruptured into RA**
- S/p surgical repair of aortic NC SVA that had ruptured into RA. After surgery no shunt by color Doppler

**D/D of Continuous flow, murmur, Doppler signal**
- PDA
- A-P window
- Aortico-RV tunnel
- Ruptured SVA into RA, RV, LA (Ruptured SVA into LV only diastolic)
- Coronary A-V fistula
- Arterial collaterals in coarctation and Pulmonary atresia
- Surgical shunts
- Peripheral pulmonary artery stenosis

@bansalmd1:

**Case 9: VSD with septal aneurysm not to be confused with ruptured SVA**
- 20-year-old male, dyspnea, murmur,
- VSD with membranous septal aneurysm (arrow)
- Location of aneurysm below aortic valve, only systolic velocity
@purviparwani: Great point-
VSD with septal aneurysm will have only systolic velocity and should not be confused with rupture of sinus of Valsalva aneurysm since the latter will have continuous flow on doppler!

@VLSorrellImages: Here's the full report for our first CASE:
https://doi.org/10.1016/j.case.2021.11.009

@bansalmd1:

**Case 10**?

We are going to leave you with this interesting case

* 37-year-old female, s/p AVR at age 29 years, admitted 8 years later BC + Group G Streptococcus, IE of AVR. TEE 4CV. What is the structure (arrow)?

@VLSorrellImages: Interested in additional CASES of SOV aneurysms?

Be sure to click on these:
https://doi.org/10.1016/j.case.2019.09.006
https://doi.org/10.1016/j.case.2023.08.005
https://doi.org/10.1016/j.case.2021.10.001
https://doi.org/10.1016/j.case.2019.11.001
https://doi.org/10.1016/j.case.2022.02.005
https://doi.org/10.1016/j.case.2022.11.004
@iamritu: Interesting #echofirst CASES of SOV aneurysms compiled

click below:

http://doi.org/10.1016/j.case...
http://doi.org/10.1016/j.case...
http://doi.org/10.1016/j.case...
http://doi.org/10.1016/j.case...
http://doi.org/10.1016/j.case...
http://doi.org/10.1016/j.case...

@bansalmd1:

Case 10:

* 37-year-old female, s/p AVR at age 29 years, admitted 8 years later BC + Group G Streptococcus, IE of AVR. TEE 4CV. What is the structure (arrow)?

![Imagery](image1)

Case 10:

* 37-year-old female, s/p AVR at age 29 years, admitted 8 years later BC + Group G Streptococcus, IE of AVR. What is the structure (arrows)?

![Imagery](image2)

Case 10:

* 37-year-old female, s/p AVR at age 29 years, admitted 8 years later with IE of prosthetic aortic prosthesis. CT scan. What is the structure next to Left main (arrow)

![Imagery](image3)

Case 10: What is the correct answer?

1. Bronchogenic cyst in the interatrial septum
2. Abscess in the interatrial septum
3. MAVF abscess
4. MAVF aneurysm
5. MAVF aneurysm and aortico-LV fistula

@EGarciaSayan: @VLSorrellImages has compiled several other interesting @CASEfromASE cased of SoV aneurysms, check them out.
Question 6:

What are common presenting symptoms of congenital LV outpouchings?

A6 Notable responses

@EGarciaSayan: Moving on to case #2: https://bit.ly/49lbiql

Question 6: What are common presenting symptoms of congenital LV outpouchings?

@NMarzlin: There is a wide range of presenting symptoms for all congenital LV outpouchings. Many are asymptomatic and found incidentally on imaging.

Arrhythmias/Palpitations are the most common symptom

@iamritu: wide range of symptoms of LV congenital outpouchings

@EGarciaSayan: @nmarzlin describes presenting symptoms of congenital LV outpouchings (often asymptomatic)

@NMarzlin: One study found ~ 50% had VT/NSVT on follow up monitoring

Although many are asymptomatic there seems to be a correlation with double chamber LV and sudden cardiac death

@EGarciaSayan: What are common presenting symptoms of congenital LV outpouchings?

nmarzlin discusses increased incidence of ventricular arrhythmias in double-chambered LV but further research needed for outcomes (given rarity of condition).

@bansalmd1: I would like to thank @AjamilTajik for his mentorship.

I would like to thank my fellow @RamySedhomMD for navigating through @X

@EGarciaSayan: Thank you, @bansalmd1 for participating in tonight’s #ASEchoJC on X and for the outstanding images and explanations on your case: http://bit.ly/3FJ2a1m

@bansalmd1: Thank you @EGarciaSayan and @VLSorrellImages for getting us involved in this great educational opportunity.

@VLSorrellImages: There are rare; often incidental findings.

May also find ventricular ectopy.

If stasis within the ‘out-pouch’, risk for thrombus and embolic events is real.
Question 7:

A7 Notable responses

@EGarciaSayan: 🌟 Question 7: What are left ventricular diverticula, and how can we distinguish them from a double-chambered left ventricle?

@EGarciaSayan: LV diverticula, like accessory LV chambers, contain all 3 cardiac layers (epicardium, myocardium, and endocardium) and have synchronous myocardial contraction in systole, but they have a narrow neck. See another great @CASEfrom ASE: https://onlinejase.com/article/S0894-7317(06)00894-7/fulltext

@NMarzlin: Left ventricular are similar to double chamber LV in that they are comprised of epicardium, myocardium and endocardium

Both have synchronous contraction with the LV

Double Chamber LV will have a wider neck and be divided by a muscular septum

@EGarciaSayan: @nmarzlin describes differences between left ventricular diverticula and double-chambered left ventricle?

@NMarzlin:

@VLSorrellImages: Here is another double-chambered LV who presented with VT:
@EGarciaSayan: @VLSorrellImages demonstrates another @CASEfromASE case of double-chambered LV presenting with VT.

@VLSorrellImages: 3D echo is very helpful in completely evaluating LV diverticula from DC-LV:

https://doi.org/10.1016/j.case.2018.11.008

@VLSorrellImages: This excellent table 1: https://doi.org/10.1016/j.case.2022.06.004

... has all the hallmarks of an excellent set of Echo Teaching Points from the 1 & Only @AJamilTajik
Table 1: Characteristics of left ventricular outpouchings

<table>
<thead>
<tr>
<th>Architecture</th>
<th>Synchronous myocardial contraction</th>
<th>Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double-chambered left ventricle</td>
<td>Yes</td>
<td>Wide</td>
</tr>
<tr>
<td>Left ventricular diverticula</td>
<td>Outpouching of the epicardium, myocardium, and endocardium</td>
<td>Yes</td>
</tr>
<tr>
<td>Left ventricular aneurysm</td>
<td>Outpouching of the epicardium, myocardium, and endocardium</td>
<td>No</td>
</tr>
<tr>
<td>Left ventricular pseudoneurysm</td>
<td>Outpouching of the epicardium and pericardium only</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Two-dimensional transesophageal echocardiography is the initial, main modality for evaluation of cardiac structure and function. Two-dimensional echocardiography, especially with the use of echocardiography ultrasound-enhancing agent, can accurately evaluate left ventricular contractility and exclude left ventricular thrombus. Both aneurysm and pseudaneurysm were excluded in this patient due to normal synchronous contractility seen on the two-dimensional transesophageal echocardiogram (Videos 4 and 6). An association with congenital diverticulum and cardiac arrhythmias has been reported. One report found that the 2 most common presenting symptoms were syncope and palpitations. During clinical follow-up, sustained or nonsustained ventricular tachycardia was seen in 53% of the cohort.

@EGarciaSayan: @VLSorrellImages reviews differential diagnosis and #EchoFirst characteristics of LV outpouchings in table by

@AJamilTajik. Look at architecture, synchronous or asynchronous motion, and neck size.
Question 8: Which echocardiographic features can help distinguish a double-chambered left ventricle from a true aneurysm or pseudoaneurysm?

@NMarzlin: The most important difference between the Double Chamber LV and a aneurysm or pseudoaneurysm is synchronous contraction with the left ventricle. This can be seen on echo as well as CT and CMR.

@kgzimmerman: Very interesting! Could have easily been tricked into suspecting a large VSD from this image. So very important to investigate multiple imaging planes... and modalities... need all the tools in our toolboxes for sure!

@NMarzlin: DCLV and aneurysms will both have a wide neck/communication where a pseudoaneurysm classically has a narrow communication on imaging.

@EGarciaSayan: Which echocardiographic features can help distinguish a double-chambered left ventricle from a true aneurysm or pseudoaneurysm?

@VLSorrellImages: Interested in reading more about congenital LV aneurysms? Check these out from @CASEfromASE:

https://doi.org/10.1016/j.case.2022.01.005
https://doi.org/10.1016/j.case.2021.11.010
https://doi.org/10.1016/j.case.2023.05.007
https://doi.org/10.1016/j.case.2017.01.008

@VLSorrellImages: I am a HUGE fan of LVO with UEA, 3DE and CMR (with LGE) to comprehensively investigate these. Some patients may need only 1, others all 3.

@EGarciaSayan: Excellent point by @NMarzlin.

- Pseudo-aneurysm: small neck and ratio to max cavity <0.5
- True aneurysm: Wide neck, contains all 3 layers
- Unlike double-chambered LV, both have dyssynchronous myocardial contraction
True Aneurysm
- Thinned myocardium
- Contains all 3 layers
- Dyssynergic myocardial contraction
- Wide neck > 0.5 ratio to max cavity
Question 9: What are the advantages and role of cardiac CT and cardiac MRI in evaluating LV outpouchings?

@EGarciaSayan: 🌟 Question 9: What are the advantages and role of cardiac CT and cardiac MRI in evaluating LV outpouchings?

@purviparwani: An easy table to review!

How do you differentiate Anursym, pseudoaneurysm and diverticulum on #whyCMR #Echofirst

Important to look beyond the neck criteria since it can be variable in the case of LV diverticulum. LV contractility and correspondence to the scarred myocardium helps further

<table>
<thead>
<tr>
<th>MR imaging features</th>
<th>Aneurysm</th>
<th>Pseudoaneurysm</th>
<th>Diverticulum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomic location</td>
<td>Apical or anterior</td>
<td>Posterior or inferior</td>
<td>Apical (congenital)</td>
</tr>
<tr>
<td>Neck</td>
<td>Wide</td>
<td>Narrow</td>
<td>Variable</td>
</tr>
<tr>
<td>Neck/mouth ratio</td>
<td>0.9-1</td>
<td>0.25-0.5</td>
<td>Variable</td>
</tr>
<tr>
<td>Contractility</td>
<td>Dyskinesia</td>
<td>Akinesia</td>
<td>Synchronous</td>
</tr>
<tr>
<td>Appearance in viability imaging</td>
<td>Enhancement in the wall of sac or pericardium</td>
<td>Enhancement of overlying pericardium</td>
<td>No enhancement in the wall of sac or pericardium</td>
</tr>
<tr>
<td>MRI, magnetic resonance imaging.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Characteristic MRI features of left ventricular outpouchings

@purviparwani: LV outpouching Table from the publication
https://researchgate.net/publication/287212334_Overview_of_left_ventricular_outpouchings_on_cardiac_magnetic_resonance_imaging...

@purviparwani: #whyCMR provides additional tissue characterization. Important to note the scar in case of LV aneurysm and Pseudo aneurysm

Here is a great publication
https://researchgate.net/publication/287212334_Overview_of_left_ventricular_outpouchings_on_cardiac_magnetic_resonance_imaging
@EGarciaSayan: @purviparwani reviews the role of #WhyCMR in evaluating LV outpouchings, tissue characterization, LGE, etc. Thanks for sharing this article.

@kgzimmerman: curious if anyone has seen this and can share images with TEE?

@NMarzlin: CT can provide detailed structural analysis and 3D reconstruction. We also used it to rule out anomalous coronary arteries in our patient.

@NMarzlin:

@iamritu: can rule out anomalous coronary arteries with #Yessct or look for LGE by #WhyCMR which increases risk of arrhythmias #echofirst

@EGarciaSayan: @nmarzlin demonstrates the role of #YesCCT in the evaluation of double-chambered LV cases. https://bit.ly/49lbqfl

@NMarzlin: Both CT and MRI can provide important additional important clinical information

CMR is often used in DCLV to look for LGE to help determine the risk of malignant arrhythmias.

@EGarciaSayan: @NMarzlin reviews the advantages and role of #YesCCT and #WhyCMR in evaluating LV outpouchings, anatomy, morphology and risk/prognosis.
Question 10:

A10 Notable responses

@EGarciaSayan: 🌟 Question 10: What is the etiology and prognosis of a double-chambered left ventricle?

@NMarzlin: The truth is the prognosis is not well known. This is partially because of how rare the finding is and the wide range of clinical manifestations from asymptomatic to sudden cardiac death. This is what makes management challenging!

@NMarzlin: DCLV are thought to be a result of abnormal development of the myocardial intratrabecular sinusoids during fetal development.

@NMarzlin: The truth is the prognosis is not well known. This is partially because of how rare the finding is and the wide range of clinical manifestations from asymptomatic to sudden cardiac death. This is what makes management challenging!

@EGarciaSayan: 🌸 Thank you all for participating in tonight’s first #ASEchoJC on X! Thanks to authors @bansalmd1 & @nmarzlin & to @VLSorrellImages for co-moderating. If you missed anything, follow the #ASEchoJC hashtag, and read the upcoming summary on our page.

👉 https://asecho.org/twitterjournalclub/

@EGarciaSayan: Another fantastic #ASEechoJC! Thanks to authors @bansalmd1 & @nmarzlin & to @VLSorrellImages for co-moderating. If you missed anything, follow the #ASEchoJC hashtag

@iamritu: Thank you for another fantastic #ASEchoJC @ASE360 💜💜💜💜💜️ Tweeting from Costa Rica on a mission to improve imaging for CVD in women in Latin America
@EGarciaSayan: Thank you @iamritu for taking the time to participate in #ASEchoJC from this important international mission 🌟

@EGarciaSayan: If you participated in yesterday’s fantastic #ASEchoJC on X, don’t forget to claim your 1.0 CME/MOC credit in the @ASE360 Learning Hub (FREE for ASE members). Stay tuned for discussion of the new COVID19 guidelines in December’s #ASEchoJC on X!

👉https://aselearninghub.org/topclass/topclass.do?expand-OfferingDetails-Offeringid=13388063