

#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

1 <http://bit.ly/3FJ2a1m> ? 1-5

2 <https://bit.ly/49lbiql> ? 6-10

👉 Remember to use #ASEchoJC in all Posts (Tweets)



ASE JOURNAL CLUB ON X
(Formerly known as Twitter Journal Club)

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AMERICAN SOCIETY OF
ECHOCARDIOGRAPHY
SOUND. SAVES. LIVES.

Thursday, Nov. 2, 2023
8:00 to 9:00 PM (ET)

JOIN THE DISCUSSION ON:

2023 ShowCASE Winner and Finalist

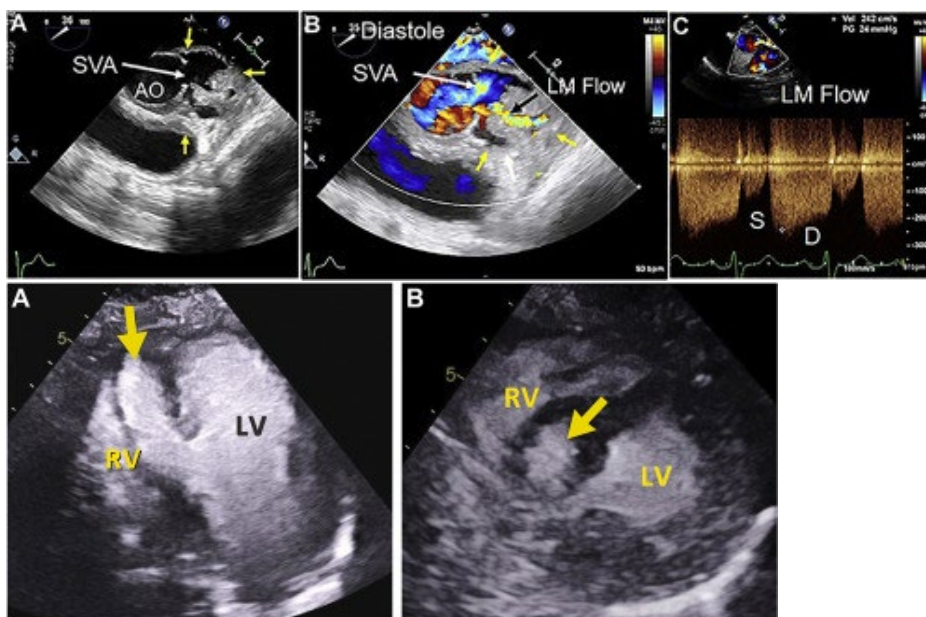
- » Extrinsic Circumflex Coronary Artery Compression and Occlusion by Mycotic Aneurysm of Left Aortic Sinus
- » Five-Chambered Heart With Double-Chambered Left Ventricle Diagnosed by Multimodality Imaging

Guest Authors Ramesh C. Bansal, MD, FASE (@bansalmd1) and Nathan Marzlin, MD (@NMarzlin) will join ASE Journal Club on X Moderators Enrique Garcia-Sayan, MD, FACC, FASE (@EGarciaSayan) and Vincent L. Sorrell, MD, FASE (@VLSorrellImages)

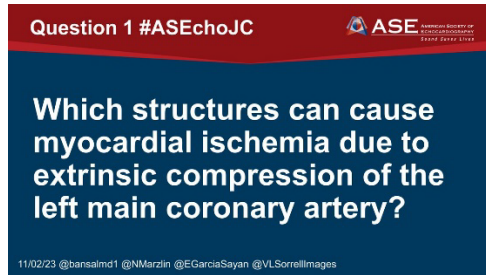
The ASE Journal Club on X (Formerly known as Twitter Journal Club) will answer your questions! Follow @ASE360 and use hashtag #ASEchoJC for all tweets!

Earn CME!

1 AMA PRA Category 1 Credit™



Q1:



A1 Notable Responses:

@EGarciaSayan: 🌟 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

🐼 some ALPACA 🐼

🐼 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?

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

@bansalmd1:

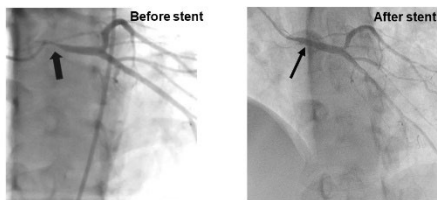
- Here is an example of severe pulmonary artery dilation in patients with pulmonary hypertension causing LM compression:

Case 1

@bansalmd1:

Case 1: Dilated MPA, PH, LM compression

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



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

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

@bansalmd1:

BMC
Cardiovascular
Disorders

bmccardiovascdisord.biomedcentral.com

Eisenmenger syndrome with left main compression :
Background Left main coronary artery disease
secondary to pulmonary artery compression relate...

@bansalmd1:

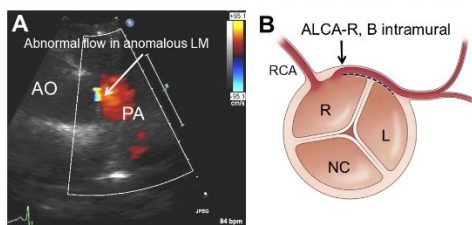
- Here is an example of anomalous LM from R sinus with interarterial or between intramural course (ALCA-R, B intramural)

Case 2

@bansalmd1: 10.1148/rg.2017160124

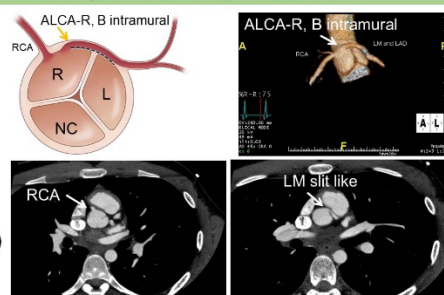
Case 2: TTE, ALCA-R, B intramural

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



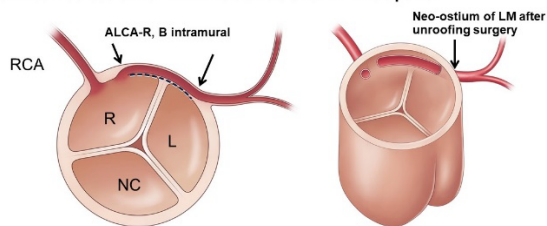
Case 2: CCTA, ALCA-R, B intramural

- 16-year-old male, chest pain and syncope. CT shows abnormal origin of LM from R sinus and between the arteries (B) or interarterial course



Case 2: Unroofing surgery, ALCACA-R, B intramural

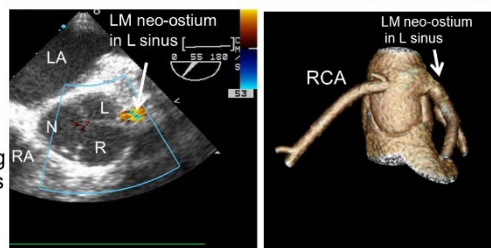
The intramural course of ALCA is opened up along over its entire length between the arrows along the dashed line in right panel, leading to creation of a wide neo-ostium of LM in left sinus shown in left panel



Agarwal PP. et al. Radiographics 2017;37: 740-757

Case 2: ALCACA-R, B, TEE SAX post-unroofing Surgery

- 16-year-old male with ALCACA-R, B intramural course, TEE SAX view after unroofing surgery shows neo-ostium in left sinus. CT on follow up



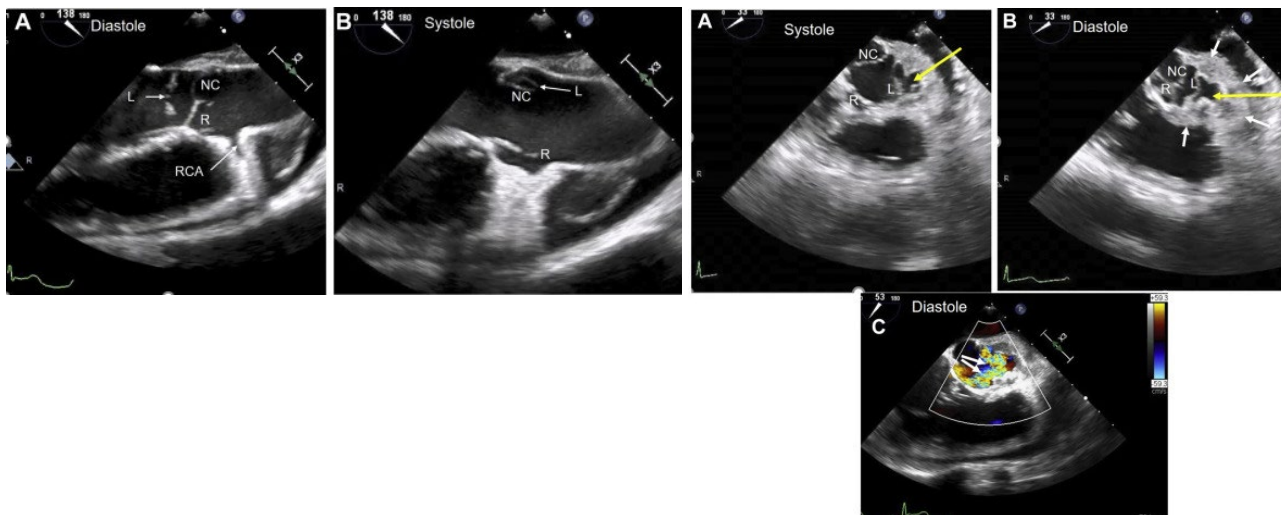
@VLSorrellImages: Ramesh, I remember that excellent slide from your ShowCASE presentation during the 2023 ASE annual scientific sessions. Congrats!

@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:



@bansalmd1:

- Here is an example of Submitral LV aneurysm causing LM compression

Case 3

Case 3: Submitral LV aneurysm with LM compression

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



Fig. 1: Two dimensional echocardiography Color Doppler imaging revealed systolic flow into the SMA and from SMA into LA



Fig. 4: Coronary angiogram showing compression of left main, left anterior descending and left circumflex artery by large SMA

Kumar P et al. Journal of The Association of Physicians of India 2018; 66 : 90-91

@bansalmd1:



Question 2:

Question 2 #ASEchoJC

ASE
American Society of Echocardiography
1978-2023

What are some of the subaortic complications of aortic valve endocarditis?

11/02/23 @bansalmd1 @NMMarzin @EGarciaSayan @VLSorrellImages

A2 Notable Responses:

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

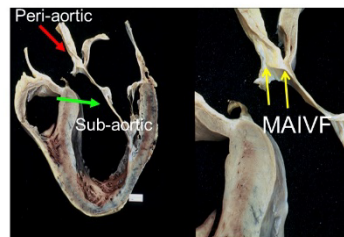
@bansalmd1:

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

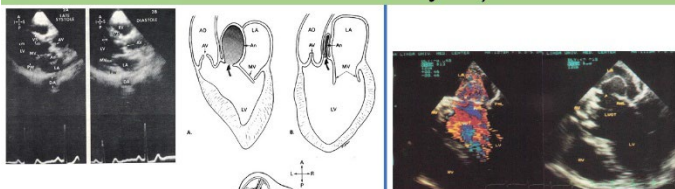


Karalis D, Bansal RC et al. TEE recognition of subaortic complications of aortic valve endocarditis. Circ 1992;86:353

Aortic valve endocarditis (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)

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

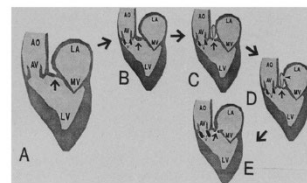


Bansal RC, Moloney PM, Marsa RJ, Jacobson JG. Mycotic aneurysm of MAIVF Circulation 1983; April;67:930-934

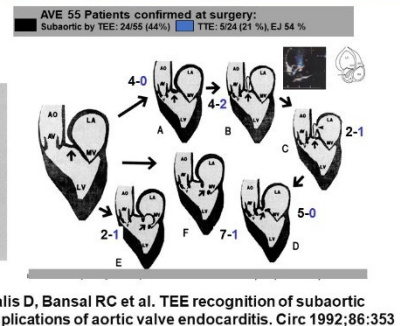
Shakudo M, Eng AK, Applegate PM, Bansal RC, Wong M, Shah PM. MV aneurysm by TEE. Echocardiography 1990; Sept;7: 551-4

AVE: Subaortic complications

JACC Vol. 15, No. 2
February 1990:499-504



Bansal RC et al. JACC 1990;15: 499-504



Karalis D, Bansal RC et al. TEE recognition of subaortic complications of aortic valve endocarditis. Circ 1992;86:353

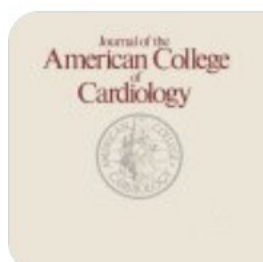
@bansalmd1: 10.1161/01.cir.86.2.353

<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](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 communication
Infection of the mitral-aortic intervalvular fibrosa occurs most commonly in association with infective...

@VLSorrellImages: 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>

Articles (133) Figures/Multimedia (221) Web Content (2)	
<input type="checkbox"/> Select all Save search Export	sorted by relevance date
<input type="checkbox"/> ACQUIRED CONSEQUENCES * Open Access	Cited in Scopus: 0
Acquired Gerbode Defect in a Patient with <i>Staphylococcus Lugdunensis</i> Aortic Valve Endocarditis	
CASE, Vol. 5, Issue 3, p193–195, Published online: March 3, 2021	
Edward Nabet, Beevash Ray	
Download PDF Export Citation	
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Three-Dimensional Echocardiography for Diagnosis of Transcatheter Prosthetic Aortic Valve Endocarditis	
CASE, Vol. 1, Issue 4, p155–158, Published in issue: August, 2017	
Yahaira Ortiz González, Ryan Ung, Joseph L. Blackshear, Steven M. Laman	
Download PDF Export Citation	
<input type="checkbox"/> CARDIAC SOURCE OF EMBOLI * Open Access	Cited in Scopus: 0
Chiari Network and Aortic Valve Endocarditis with Concurrent Pulmonary and Systemic Embolization	
CASE, Vol. 1, Issue 1, p37–40, Published in issue: February, 2017	
Yogita Rochiani, Jagpal Khair, Srikanth Vallurupalli, Satish Kenchaiah	
Download PDF Export Citation	
<input type="checkbox"/> FISTULAS * Open Access	Cited in Scopus: 0
An Occult Aortocavitary Fistula Presenting as Apparent Tricuspid Valve and Aortic Valve Endocarditis	
CASE, Vol. 3, Issue 1, p28–34, Published online: October 29, 2018	

@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.

@bansalmd1: 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

25-year old man with AVE, TEE AV vegetation, unruptured mycotic R aortic SVA 34-year old man with IE, TTE: Ruptured R SVA into RV with high velocity continuous systolic and diastolic flow

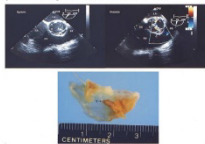


Figure 2 Multiple transverse echocardiographic images of aortic root. Upper left panel shows aortic regurgitation into the aortic valve. Middle right panel shows aortic regurgitation into the right ventricle. Lower right panel shows aortic regurgitation into the right ventricle. Scale bar: 1 cm.

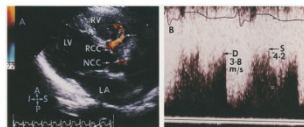


Figure 3 Parasternal long-axis view with color flow imaging (A) showing a ruptured right aortic sinus of Valsalva and communication with the right ventricle and left-to-right shunt flow signal (arrow). Continuous wave Doppler interrogation of the shunt flow (B) shows a high-velocity systolic (S) signal of 4.2 and a high-velocity diastolic (D) signal of 3.8 m/sec due to continuous pressure gradient between the aorta and the right ventricle. A, Anterior; L, inferior; LA, left atrium; LV, left ventricle; LVCC, noncoronary aortic valve cusp; P, posterior; RVCC, right coronary cusp; RV, right ventricle; S, superior.

Right aortic sinus rupture into RV. Bansal RC, Wangnes KM, Bailey L. JASE 1993;6:308-11

Batista C, Bansal RC et al. Echo features of unruptured mycotic aneurysm of R aortic sinus. JASE 2004; 17:474-477

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)

Bansal RC et al. Case: Cardiovascular Imaging case Reports. June 2022;6:158-64

AVE: Sub-aortic Complications

AV Endocarditis: Sub-aortic Complications

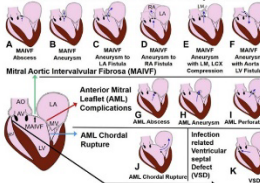


Figure 1 Spectrum of subaortic complications of AV endocarditis. The infected jet of aortic regurgitation can strike the subaortic structures and lead to secondary infection of MAVF, AML, chordae tendineae of AML, and ventricular septum. MAVF infection will produce abscess (A), a mycotic aneurysm from expansion of the infected structure, and this aneurysm shows systolic filling (arrow) and diastolic emptying (arrowhead) (B). Filicula by rupture into the LA (C), filicula by rupture into the RA (D), compression of LA and branches with infarction (E), and rupture into LV (F). For AML, infection can produce abscess (G), AML aneurysm (H), and perforation (I). Infection of chordae tendineae may cause chordal rupture and fall AML (J). Infection can lead to septal involvement and VSD (K). AML, Anterior mitral leaflet; AOC, aortic valve; LA, left atrium; LVCC, left circumflex; LV, left ventricle; LVV, ventral valve; RA, right atrium; RV, right ventricle.

Bansal RC et al. Case: Cardiovascular Imaging case Reports. June 2022;6:158-64

AVE: Peri-aortic Complications

AV Endocarditis: Peri-aortic Complications

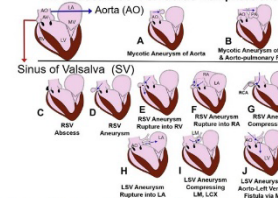
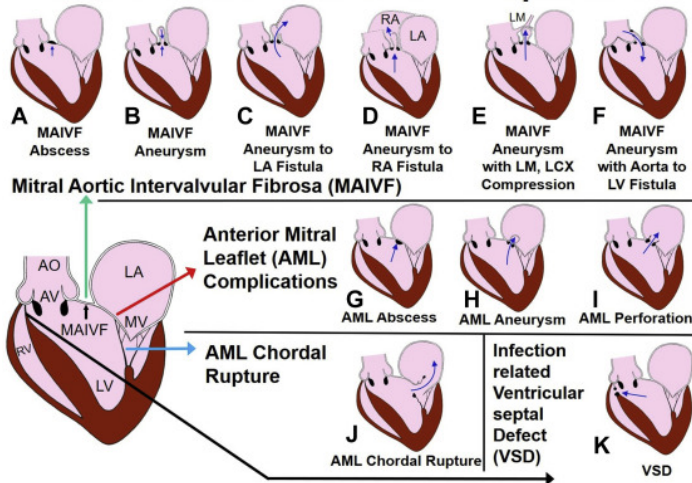


Figure 2 Spectrum of peri-aortic complications of aortic valve endocarditis. Mycotic aneurysm of the AO (A) and rupture of the aneurysm into the PA with shunt (B). Infection can involve aortic ring and any SV and cause dissection (involvement of RV is shown in panel C). RSV aneurysm (D), and RSV aneurysm rupture into the RV (E) and RA (F). Involvement of RSV can cause compression of the RCA and left main (G). An LSV aneurysm can rupture into the left atrium (H), cause compression of the LM and LCC (I), and erode into MAVF with formation of aorta to left ventricular fistula (J). AOC, Aorta; LCC, left circumflex; LSV, left sinus of Valsalva; PA, pulmonary artery; RA, right atrium; RCA, right coronary artery; RSV, right sinus of Valsalva; RV, right ventricle; SV, sinus of Valsalva.

Bansal RC et al. Case: Cardiovascular Imaging case Reports. June 2022;6:158-64

@EGarciaSayan: @bansalmd1 describes various subaortic complications of AV endocarditis. Also, see the fantastic Figure 1 from the case!

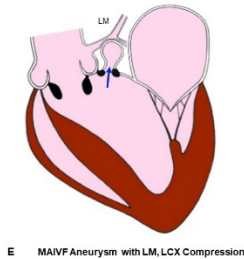
AV Endocarditis: Sub-aortic Complications



@bansalmd1:

MAIVF aneurysm with compression of anomalous CX

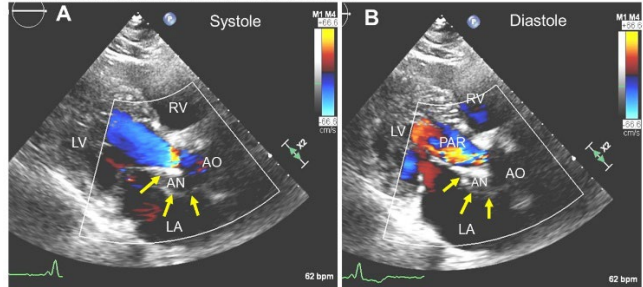
- An example of a case of mycotic aneurysm of mitral-aortic intervalvular Fibrosa (MAIVF) causing LM/circumflex(CX) compression



E MAIVF Aneurysm with LM, LCX Compression

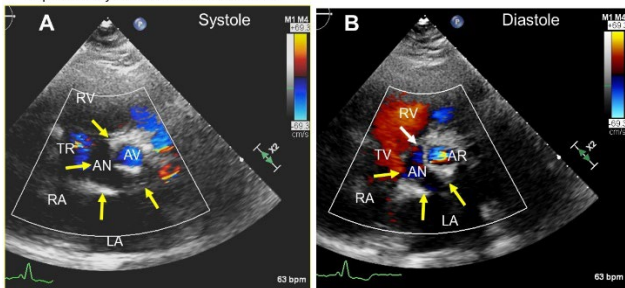
Case 4: MAIVF aneurysm, compression of anomalous CX

- 68-year-old female, h/o surgical AVR due to IE using St. Jude Trifecta bioprosthesis at OSH in 9/2015. TTE PLAX view 5 year later: severe bioprosthetic central AR (PAR), MAIVF aneurysm (AN) between yellow arrows, expands in systole and empties in diastole into LV and become smaller



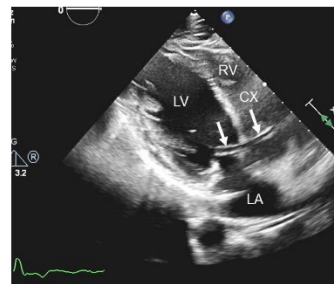
Case 4: MAIVF aneurysm, compression of anomalous CX

- 68-year-old female, h/o surgical AVR due to IE using St. Jude Trifecta bioprosthesis at OSH in 9/2015. TTE SAX view: 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

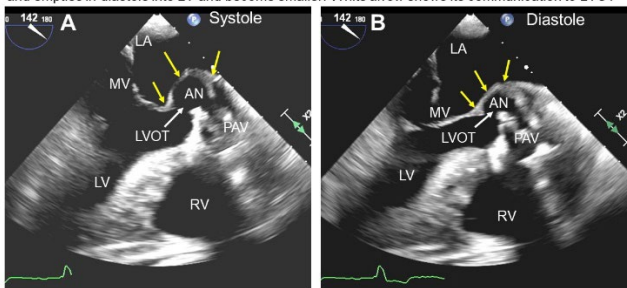
- 68-year-old female, h/o surgical AVR due to IE using St. Jude Trifecta bioprosthesis at OSH in 9/2015. TTE foreshortened 4-CV: anomalous circumflex (CX) from right aortic sinus with retroaortic course (arrows)



@bansalmd1:

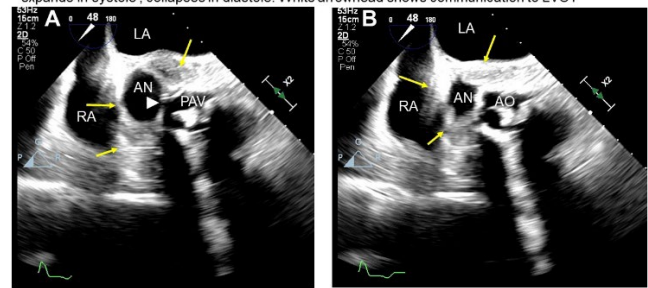
Case 4: MAIVF aneurysm, compression of anomalous CX

- 68-year-old female, h/o surgical AVR due to IE using St. Jude Trifecta bioprosthesis at OSH in 9/2015. TTE 5 year later, LAX view: a large MAIVF aneurysm (AN) between yellow arrows, expands in systole and empties in diastole into LV and become smaller. White arrow shows its communication to LVOT

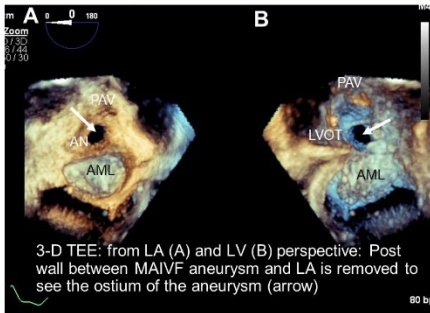


Case 4: MAIVF aneurysm, compression of anomalous CX

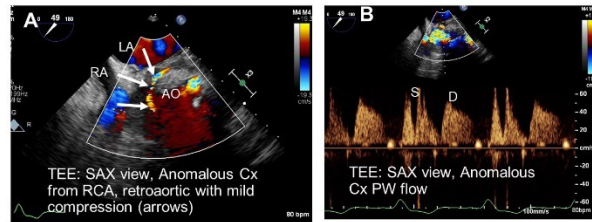
- 68-year-old female, h/o surgical AVR due to IE using St. Jude Trifecta bioprosthesis at OSH in 9/2015. TTE 5 year later, SAX view: a large MAIVF aneurysm (AN) between yellow arrows. It is partially clotted, expands in systole, collapses in diastole. White arrowhead shows communication to LVOT



Case 4: MAIVF aneurysm, compression of anomalous CX



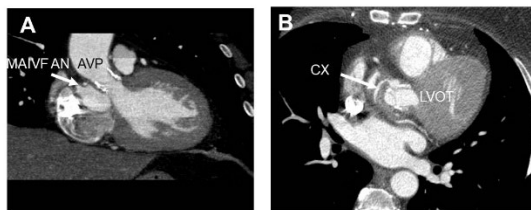
Case 4: MAIVF aneurysm with mild compression of anomalous Cx



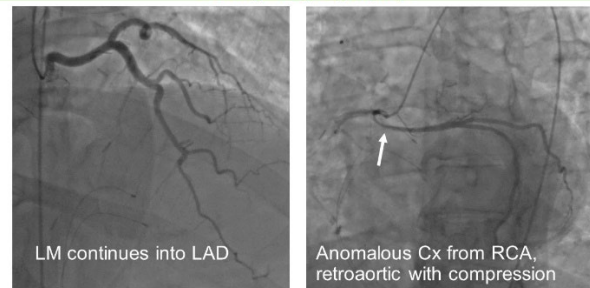
@bansalmd1:

Case 4: MAIVF aneurysm, compression of anomalous CX

- 68-year-old female, h/o surgical AVR due to IE using St. Jude Trifecta 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>

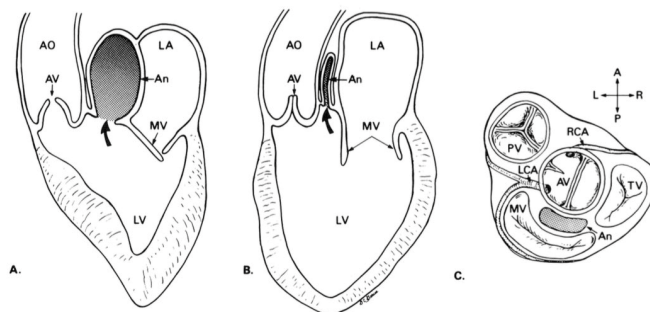


FIGURE 4. The location of the left ventricular outflow tract pseudoaneurysm (An). (A) Systolic frame of the left ventricular long-axis view showing the opening (curved arrow) of the aneurysm between the posterior aortic valve (AV) cusp and the anterior mitral leaflet. Bicuspid aortic valve shows systolic doming. (B) Diastolic frame showing collapse of the aneurysm. (C) Relation of aneurysm to cardiac valves, viewed from above. PV = pulmonic valve; TV = tricuspid valve; other abbreviations as in figures 1 and 2.

Question 3:

Question 3 #ASEchoJC

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AMERICAN SOCIETY OF
ECHOCARDIOGRAPHY
EST. 1978

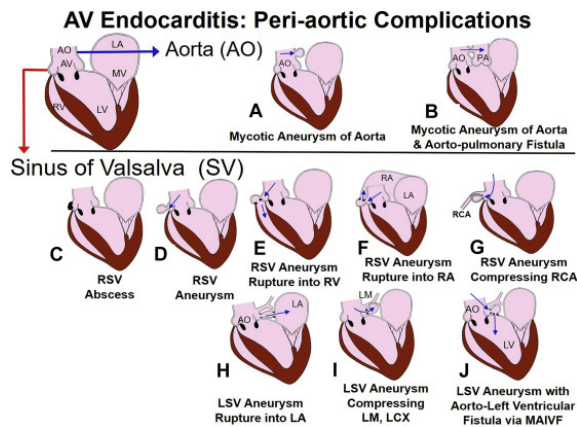
What are some of the peri-aortic complications of aortic valve endocarditis?

11/02/23 @bansalmd1 @NMazlin @EGarciaSayan @VLSorrellimages

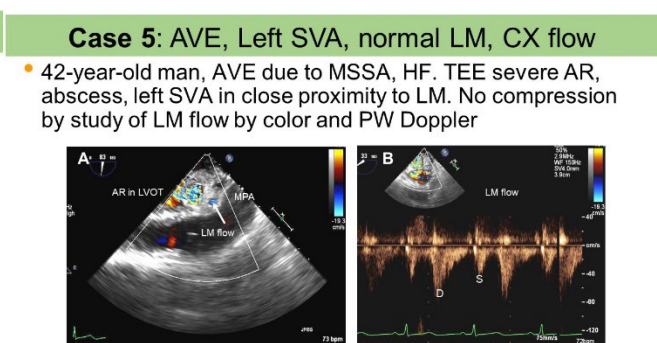
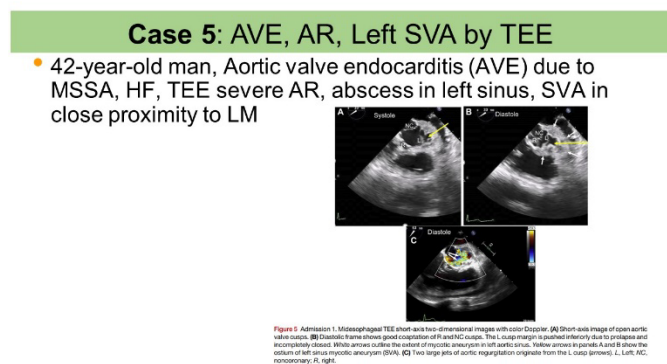
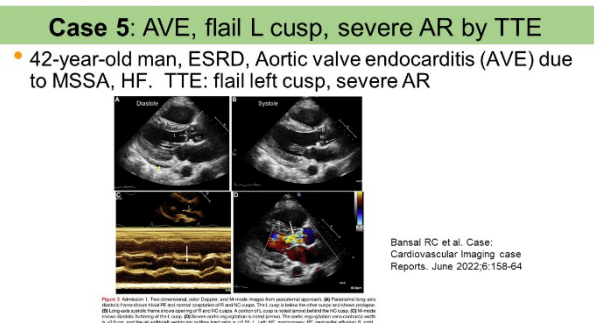
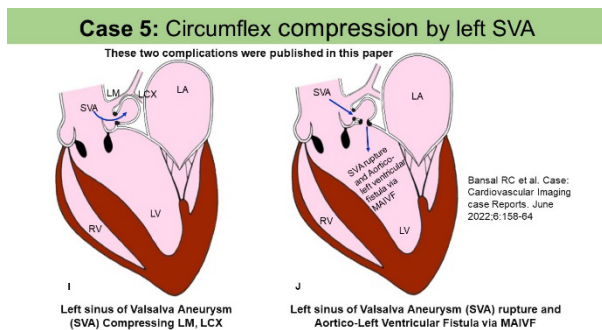
A3 Notable Responses:

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

@EGarciaSayan: 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>



@bansalmd1:

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

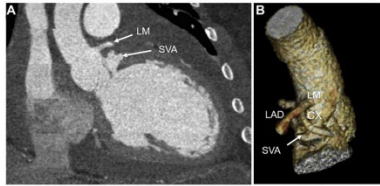


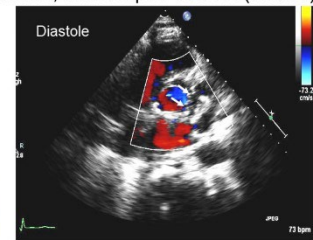
Figure 6 Admission 1. Cardiac CT scan. (A) Coronal image shows separation between LM ostium and SVA. (B) Three-dimensional volume-rendered cardiac CT image shows the proximity of LM, LAD, CX, and coronary artery to SVA but no compression. CX, Circumflex; LAD, left anterior descending artery.

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)



Figure 7 Admission 1. The aortic valve explanted at surgery; leaflets are shown to correspond to the TEE short-axis view. The right cusp is the smallest. The left cusp is very large. No vegetation is noted. Basal attachment of the left cusp to the left sinus (outlined by arrowheads) is shown. The cusp appeared thick, redundant, and inflamed and showed severe prolapse at surgical inspection. L, Left; R, right.

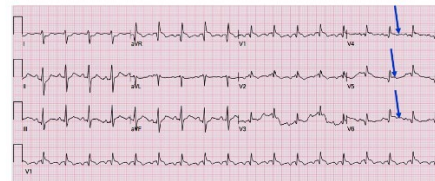


Case 5: Left SVA with AVE, s/p AVR, Readmitted

- Re-admitted 3 month later with SOB, Trop-T increased 4.8 ng/mL, ECG STEMI, BC + for Enterococcus, mycotic left SVA, causing extrinsic compression of L Cx, MI. Aortico-LV fistula, Echo findings confirmed, had Bentall, MVR for FMR

Case 5: Left SVA with AVE, s/p AVR, Readmitted with lateral MI

- Re-admitted 3 month later with SOB, Trop-T increased 4.8 ng/mL, ECG lateral STEMI (arrows)



@bansalmd1:

Case 5: Left SVA, Cx compression

- Re-admitted 3 month later with SOB, lateral STEMI, angiogram: LM compression, occluded CX

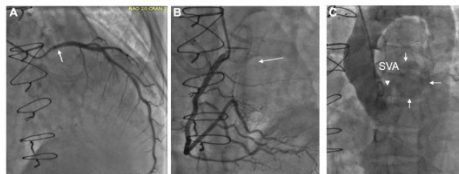


Figure 10 Admission 2. Images of coronary angiography during second admission 3 months after first surgery when the patient presented with lateral infarction. (A) Compression of the proximal LM (arrow) and absence and complete occlusion of left circumflex coronary artery. (B) Right coronary artery angiogram shows filling of circumflex via collaterals (arrow). (C) Aortogram shows opacification left SVA outlined by thin arrows (SVA) via a connection (arrowhead) in the left aortic sinus. The bottom of the SVA showed a small connection with the left ventricle through MAIVF in real-time angiography that was not appreciated in the still image.

Case 5: Left SVA, cx compression

- Re-admitted 3 month later with SOB, lateral STEMI, angiogram: LM compression, occluded CX, BC + for Enterococcus. TTE: lateral MI

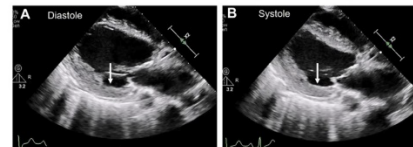


Figure 11 Admission 2. TEE transgastric long-axis two-dimensional and color Doppler images. (A) Systole. (B) Diastole. Blood flows toward the LV outflow tract and aorta in blue (arrows) in systole. Blood returns toward the LV outflow tract in red (arrow) in diastole. This finding combines with a normal functioning prosthetic aortic valve suggested that the left SVA had eroded into the MAIVF and created an aorta to L fistula (which was confirmed at surgery). LV, Left ventricular, ventricle.

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

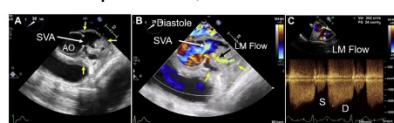


Figure 12 Admission 2. Mid-esophageal TEE two-dimensional, color Doppler, and continuous-wave Doppler images. (A) Short-axis image of the aortic root shows a large left SVA due to patch dehiscence. The ostium of the SVA is shown by a large arrow, and its extent by yellow arrows. (B) Color flow imaging shows emptying of SVA in blue in diastole (arrow). The extent of the SVA is shown by yellow arrows. Turbulent, mosaic color, high-velocity flow (black arrow) suggests LM obstruction due to extrinsic compression. (C) Color-guided continuous-wave Doppler examination of the LM flow shows mildly increased systolic (S) and very high diastolic (D) velocity of ~2 m/sec. The LM is very long, and no left circumflex is noted. Findings are consistent with LM compression and likely left circumflex occlusion. AO, aorta.



Case 5: LSV aneurysm, 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- MAIVF-LV fistula

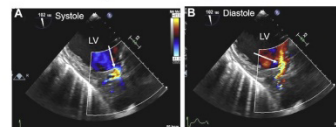
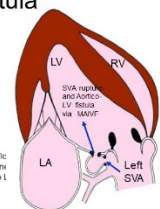


Figure 13 Admission 2. TEE transgastric long-axis two-dimensional and color Doppler images. (A) Systole. (B) Diastole. Blood flows toward the LV outflow tract and aorta in blue (arrows) in systole. Blood returns toward the LV outflow tract in red (arrow) in diastole. This finding combines with a normal functioning prosthetic aortic valve suggested that the left SVA had eroded into the MAIVF and created an aorta to L fistula (which was confirmed at surgery). LV, Left ventricular, ventricle.



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

@CASEfromASE

Question 4:

Question 4 #ASEchoJC

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ECHOCARDIOGRAPHY
STATE-OF-THE-ART

What are the causes and predominant location of aneurysms of the sinus of Valsalva?

11/02/23 @bansalmd1 @NMarzlin @EGarciaSayan @VLSorrellimages

A4 Notable responses

@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

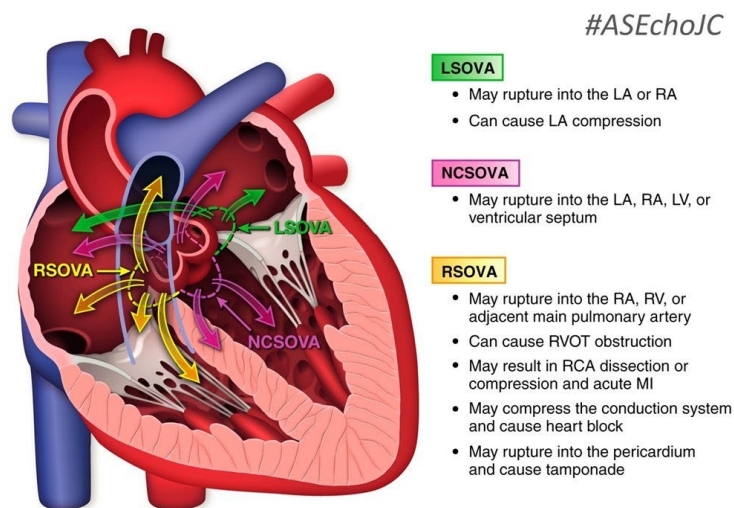


Image from: ASEs comprehensive echocardiography, third edition.

@bansalmd1: 10.1016/j.jtcvs.2012.12.059

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

- Etiology:
 - Congenital
 - Acquired: IE, trauma, surgical, trauma, Takayasu
- Location:
 - RSVa 75-80 %, NSVA 20 %, LSVA < 2 %
 - Rupture site: RSVa into RV (70 %), into RA (30 %)
 - NSVA into RA (90 %), into RV (10 %)
 - LSVA 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 %), LSVA = 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
 - LSVA (T 2): 2 (100 %) into LA
 - VSD: 77/159 (48 %), supracristal, membranous

Xin-Jin L et al. J Thorac Cardiovasc Surg 2013;146:874-8

Aortic SVA: Location, classification

TABLE 2. Classification systems for RSVA		
Type	Sakakibara classification	Modified Sakakibara classification
I	Originating from left part of right coronary sinus, penetrating into center of right ventricle, just beneath commissure of right and left pulmonary valves	Penetration and rupture into right ventricle just beneath pulmonary valve
II	Originating from central part of right coronary sinus, penetrating into right ventricle, penetrating sinus septum/ventricles	Penetration and rupture into or just beneath sinus septum/ventricles of right ventricle
IIIa	Originating from posterior part of right coronary sinus, penetrating into right ventricle, just beneath septal leaflet of tricuspid valve, penetrating membranous septum	Penetration and rupture into right ventricle adjacent to or at tricuspid annulus
IIIb	Originating from posterior part of right coronary sinus, penetrating into right atrium, near commissure of septal and anterior leaflets of tricuspid valve	Penetration and rupture into right atrium adjacent to or at tricuspid annulus
IV	Originating from right part of noncoronary sinus, penetrating into right atrium, near septal leaflet of tricuspid valve	Penetration and rupture into right atrium
V		Other rare conditions (eg, rupture into left atrium, pulmonary artery, left ventricle, or other structures)

RSVA, Ruptured sinus of Valsalva aneurysm.

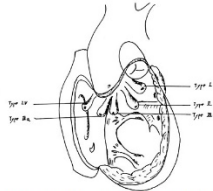
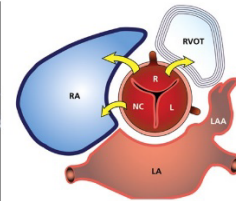
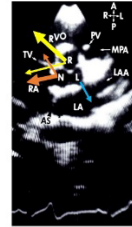


FIGURE 1. Illustration of types I to IV ruptured sinus of Valsalva aneurysm (RSVA) in modified Sakakibara classification system.

Modified Sakakibara classification system for ruptured sinus of Valsalva aneurysm. Xin-Jin L et al. J Thorac Cardiovasc Surg 2013;146:874-8

Aortic SVA rupture site and TTE image

TTE SAX image: RSVA into RV, RA; NC SVA into RA or RV; L SVA into LA, LV
R SVA can be associated with subpulmonic or membranous and NC SVA can be associated with membranous VSD



Hoey ET. A et al. AJR 2010;194: W495-504

@EGarciaSayan: @bansalmd1 describes causes and predominant location of aneurysms of the sinus of Valsalva

Question 5:

Question 5 #ASEchoJC

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ESTABLISHED 1977

What are the clinical manifestations of sinus of Valsalva aneurysms?

11/02/23 @bansalmd1 @NMarzlin @EGarciaSayan @VLSorrellimages

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

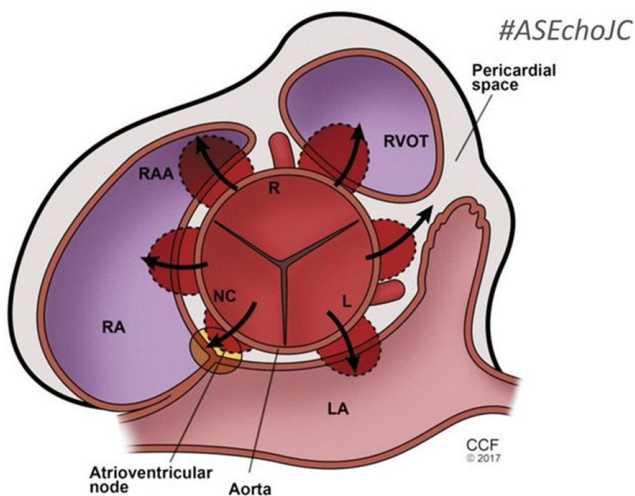


Image from: J Am Soc Echocardiogr. 2020 Mar;33(3):295-312.

@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!

- @bansalmd1:** <https://ncbi.nlm.nih.gov/pmc/articles/PMC101268/>

Case 6: Aortic Left SVA causing coronary compression

- 75-year-old woman, L SVA, compression of diagonal artery by angiogram

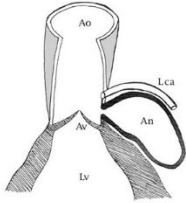


Fig. 3 Drawing shows the aneurysm of the sinus of Valsalva and the left coronary artery compression. An = aneurysm, Ao = aorta, Av = aortic valve, LCA = left coronary artery, Lv = left ventricle.

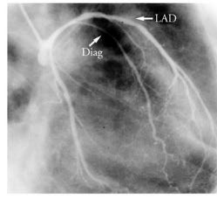
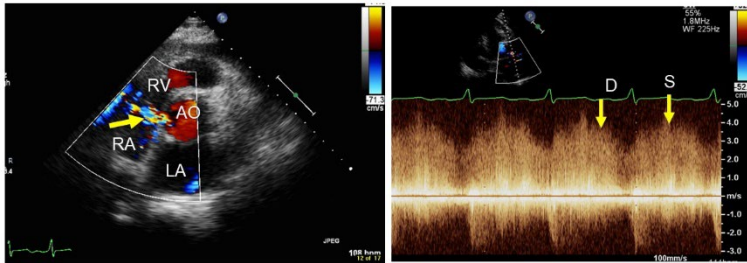


Fig. 2 Selective angiogram of the left coronary artery shows the main trunk and the left anterior descending coronary artery (LAD) displaced upward. The proximal portion of the diagonal branch (Diag) is markedly compressed by the aneurysm.

Lijoi A. et al. Tex Heart J 2002; 29:40-4

Case 7: AVE, aortic Right SVA, rupture into RA

- 51-year-old man, AV endocarditis, right SVA, rupture into RA. TTE with color flow and Doppler show high velocity systolic and diastolic continuous flow into RA



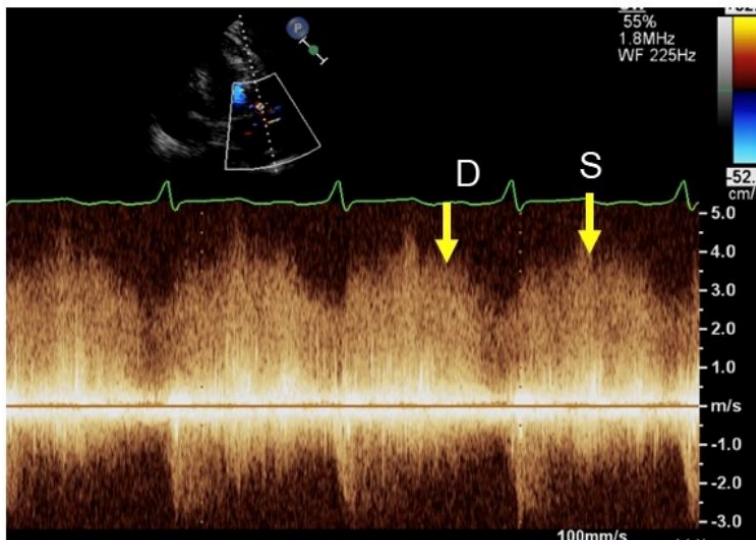
@purviparwani: This Doppler profile showing rupture of sinus of Valsalva aneurysm into RA should be noted!

-> Doppler with rupture SOV will be Continuous.

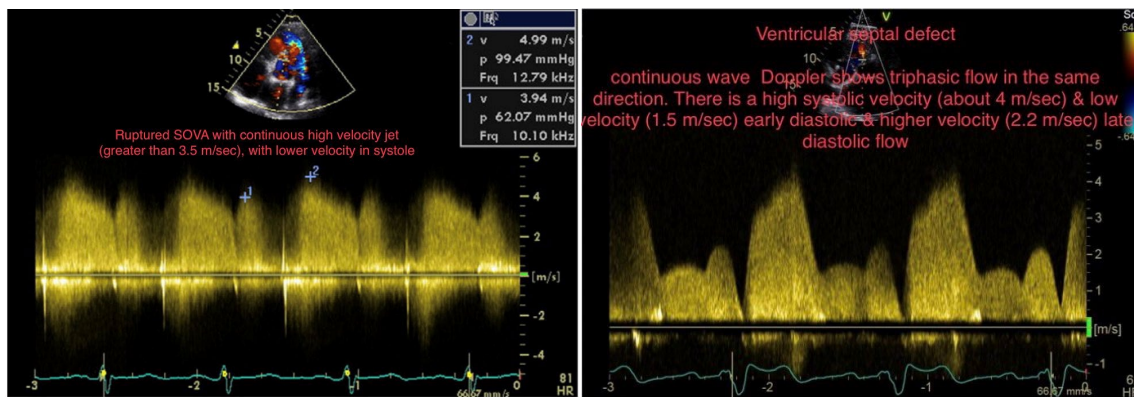
-> almost 4m/ s jet due to the pressure difference between RA and aorta

@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



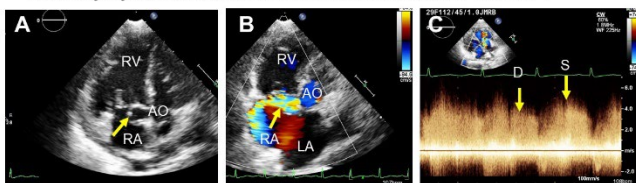
@EGarciaSayan: @bansalmd1 demonstrates characteristic spectral Doppler pattern of ruptured SoV aneurysm. Continuous high-velocity flow with diastolic accentuation. Differentiate from characteristic biphasic pattern of VSD with predominant systolic flow. @iamritu shared this in a prior #ASEchoJC



@bansalmd1:

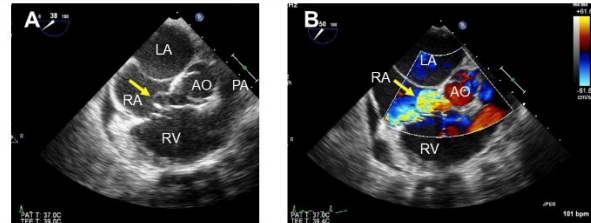
Case 8: AVE, aortic NC SVA, rupture into RA

- 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



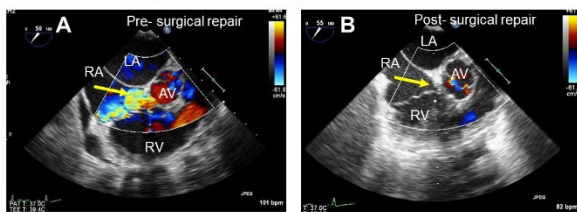
Case 8: AVE, aortic NC SVA, rupture into RA

- 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



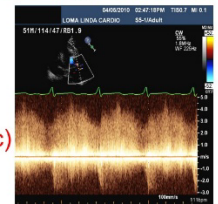
Case 8: S/p surgical repair of aortic NC SVA that had ruptured into RA

- 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

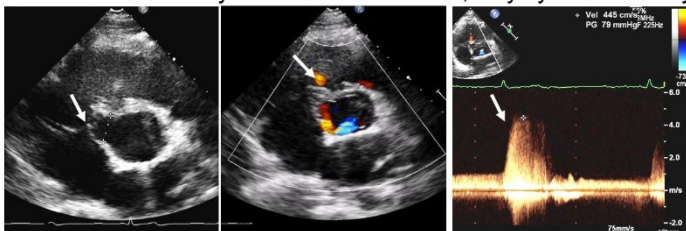
- PDA
- A-P window
- Aortico-RV tunnel
- Ruptured SVA into RA, RV, LA
- (Ruptured SVA into LV only diastolic)
- Coronary A-V fistula
- Arterial collaterals in coarctation and Pulmonary atresia
- Surgical shunts
- Peripheral pulmonary artery stenosis



@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

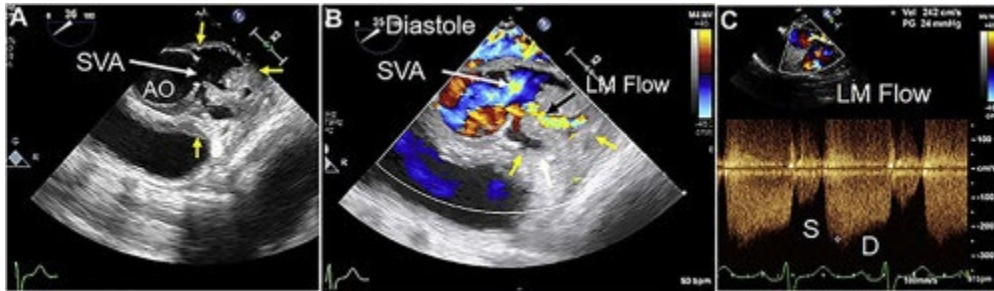


@purviparwani: Great point-

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>

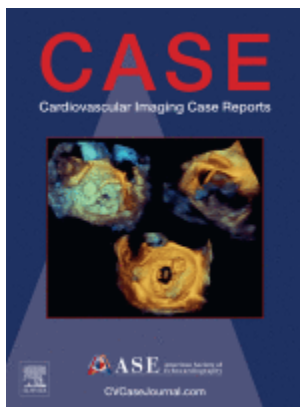
<https://doi.org/10.1016/j.case.2021.10.001>

<https://doi.org/10.1016/j.case.2019.11.001>

<https://doi.org/10.1016/j.case.2021.09.011>

<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...>

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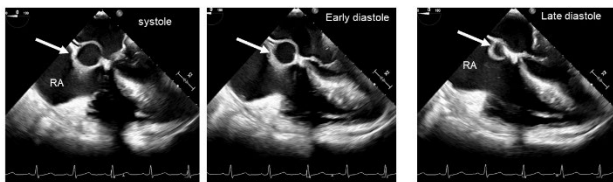
<http://doi.org/10.1016/j.case...>

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

@bansalmd1:

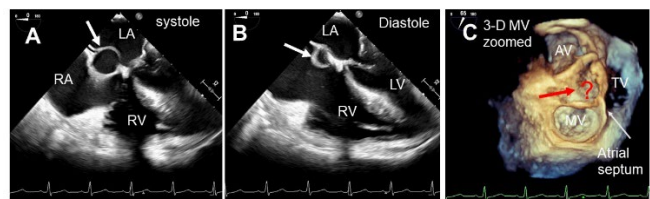
Case 10 ?

- 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)?



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)?



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)?

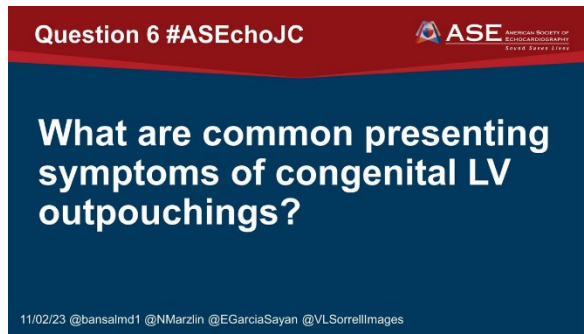


Case 10: What is the correct answer?

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

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

Question 6:



A6 Notable responses

@EGarciaSayan: ⚡ Moving on to case #2: <https://bit.ly/49lb1ql>

⚡ 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:

Question 7 #ASEchoJC

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Echocardiography
ESTD 1978

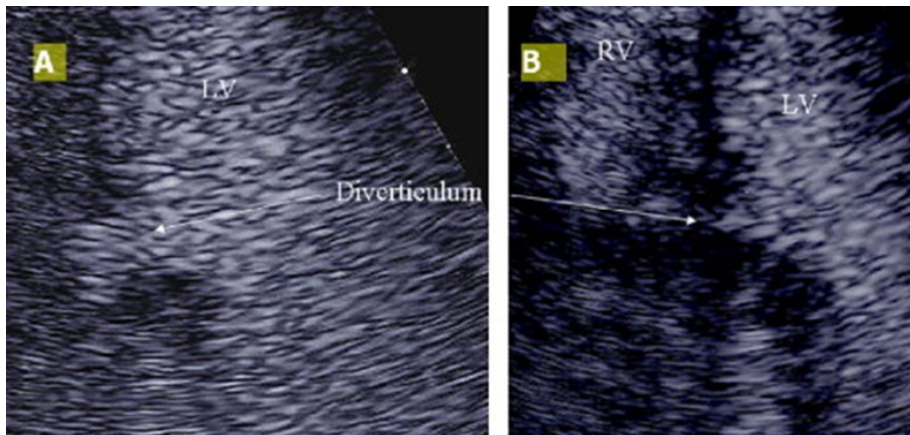
What are left ventricular diverticula, and how can we distinguish them from a double-chambered left ventricle?

11/02/23 @bansalmd1 @NMarzlin @EGarciaSayan @VLSorrellImages

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](https://onlinejase.com/article/S0894-7317(06)00894-7/fulltext)



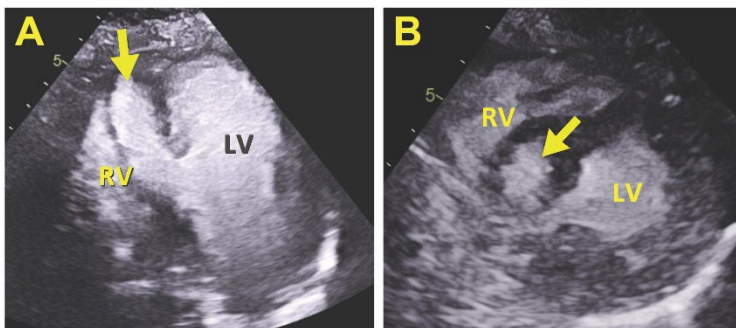
@NMarzlin: Left ventricular are similar to double chamber LV in that they are comprised of epicardium, myocardium and endocardium

Both have synchronous contraction with the LV

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

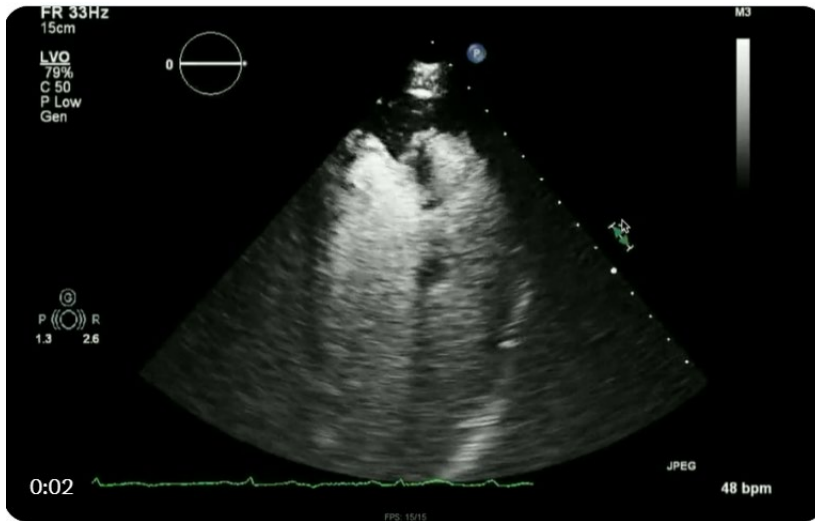
@EGarciaSayan: @nmarzlin describes differences between left ventricular diverticula and double-chambered left ventricle?

@NMarzlin:



@VLSorrellImages: Here is another double-chambered LV who presented with VT:

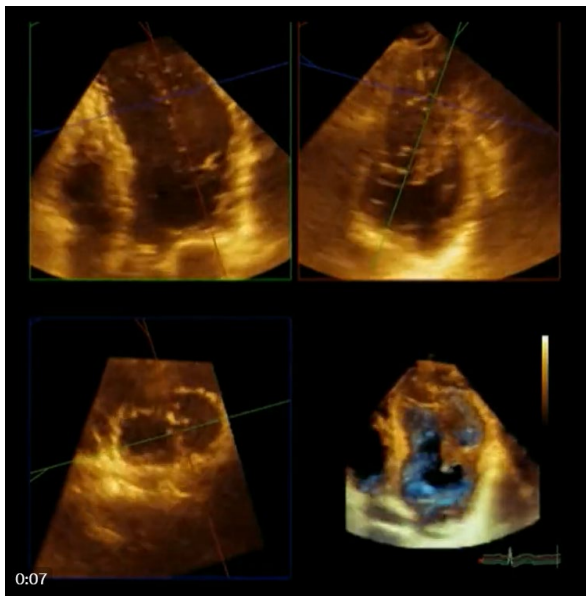
<https://doi.org/10.1016/j.case.2018.11.008>



@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

	Architecture	Synchronous myocardial contraction	Communication/neck
Double-chambered left ventricle	A division of the left ventricle involving the myocardium and endocardium creating a muscular septum	Yes	Wide
Left ventricular diverticula	Outpouching of the epicardium, myocardium, and endocardium	Yes	Narrow
Left ventricular aneurysm	Outpouching of the epicardium, myocardium, and endocardium	No	Wide
Left ventricular pseudoaneurysm	Outpouching of the epicardium and pericardium only	No	Narrow

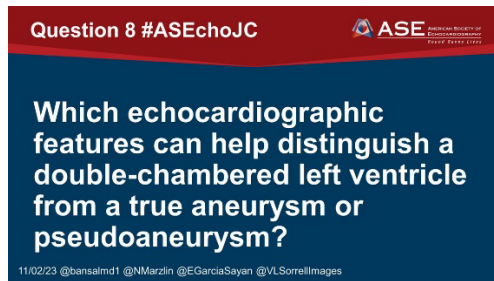
[Open table in a new tab](#)

Two-dimensional transthoracic echocardiography is the initial, main modality for evaluation of cardiac structure and function. Two-dimensional echocardiography, especially with the aid of echocardiography ultrasound-enhancing agent, can accurately evaluate left ventricular contractility and exclude left ventricular thrombus. Both aneurysm and pseudoaneurysm were excluded in this patient due to normal, synchronous contractility seen on the two-dimensional transthoracic echocardiogram (Videos 4 and 5). 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.⁵ During clinical follow-up, sustained or nonsustained ventricular tachycardia was seen in 53% of the cohort.⁵

@EGarciaSayan: @VLSorrelllImages 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:



A8 Notable responses

@EGarciaSayan: ✨ 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 synchronic 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>

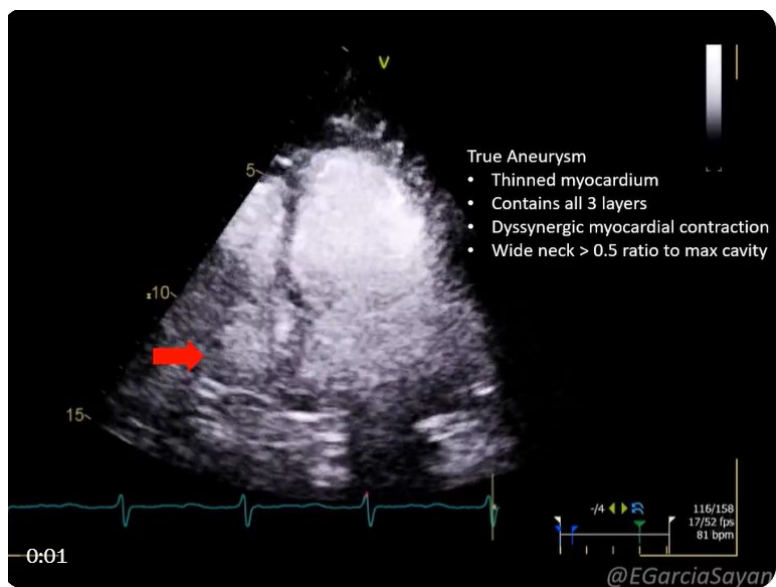
<https://doi.org/10.1016/j.case.2023.05.007>

<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



Question 9:

Question 9 #ASEchoJC

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What are the advantages and role of cardiac CT and cardiac MRI in evaluating LV outpouchings?

11/02/23 @bansalmd1 @NMazlin @EGarciaSayan @VLSorrellimages

A9 Notable responses

@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 Aneurysm, 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

MR imaging features	Aneurysm	Pseudoaneurysm	Diverticulum
Anatomic location	Apical or anterior	Posterior or inferior	Apical (congenital)
Neck	Wide	Narrow	Variable
Neck/mouth ratio	0.9-1	0.25-0.5	Variable
Contractility	Dyskinesia	Akinesia	Synchronous
Appearance in viability imaging	Enhancement in the wall of sac corresponding to scarred myocardium	Enhancement of overlying pericardium	No enhancement in the wall of sac or pericardium

MRI, magnetic resonance imaging.

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...

Overview of left ventricular outpouchings on cardiac magnetic resonance imaging

Arav Mahesh, Sudip Kumar

Abstract: Left ventricular outpouchings (LVOs) are common findings on cardiac magnetic resonance (CMR) imaging. They can be classified into three types: aneurysms, pseudoaneurysms, and diverticula. This review discusses the imaging features and clinical significance of LVOs. Aneurysms are characterized by a wide neck and dyskinesia. Pseudoaneurysms have a narrow neck and akinesia. Diverticula are congenital and have a wide neck and synchronous contraction. Viability imaging can help differentiate between aneurysms and pseudoaneurysms.

Keywords: Left ventricular outpouching, CMR, aneurysm, pseudoaneurysm, diverticulum.

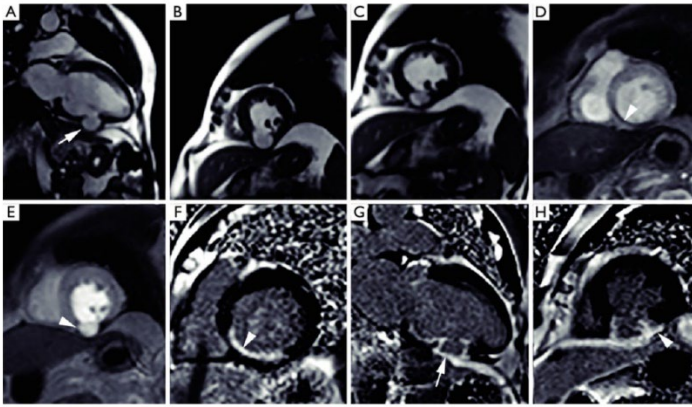
researchgate.net

(PDF) Overview of left ventricular outpouchings on cardiac magnetic resonance imaging (CMR) | Left ventricular outpouchings commonly include aneurysm, pseudoaneurysm, and ...

@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...

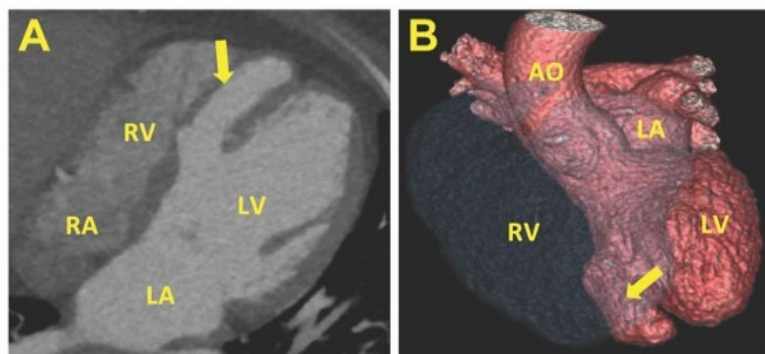


@EGarciaSayan: @purviparwani reviews the role of #WhyCMR in evaluating LV outpouchings, tissue characterization, LGE, etc. Thanks for sharing this article.

@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/49lbiql>


@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:

Question 10 #ASEchoJC

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What is the etiology and prognosis of a double-chambered left ventricle?

11/02/23 @bansalmd1 @NMarzlin @EGarciaSayan @VLSorrellImages

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 #ASEchoJC! 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>