Iatrogenic Coronary Dissection: Diagnosis and Management using IVUS

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Case Presentation:

- 69 y.o. female s/p mechanical aortic valve 24 years ago, presumably for bicuspid aortic valve syndrome, however hx was unclear. She had a known ascending aorta/aortic root aneurysm and was intermittently undergoing aortic surveillance imaging. She presented to an outside hospital with an acute Type A aortic dissection.

- CT imaging demonstrated a large root aneurysm with dissection originating above the coronaries with contained rupture, extending to the arch, descending aorta, and iliac bifurcation. She was transferred to UNMC and taken emergently to the operating room.

- She underwent complex repair with failure to come off bypass post-procedure requiring VA ECMO support, and chest remained open. She was unable to be weaned from pressors and continued to only have intermittent pulsatility. Due to failure to progress adequately an aortic root angiogram was requested to be performed.

Ring Ring “We have an add on for you…don't worry it’s just a quick aortogram”

- A non-selective aortogram was requested to evaluate for aorto-ostial anastomosis of the LM and RCA.

- Aortogram of the ascending aorta showed severe stenosis of the ostial left main with possible dissection of the left main at the anastomotic site of the dacron graft of the ascending aorta. Slow flow was noticed in LCX and LAD. Possible ostial stenosis was seen in the RCA but good flow was visualized.

- Discussions between CTS and IC concluded that the patient may not tolerate a CABG and therefore the decision was made to revascularize the LM.

The procedure:

- 7 fr EBU 3.5 guide was used to intubate the left main. Minamo guidewire was advanced into LCX. Then IVUS was used to image the LM and LCX. IVUS showed our wire was in true lumen.

- A non compliant (NC) 3.0x15m euphora balloon was inflated. Angiographic images then showed TIMI 3 flow in LM, LCX and LAD.

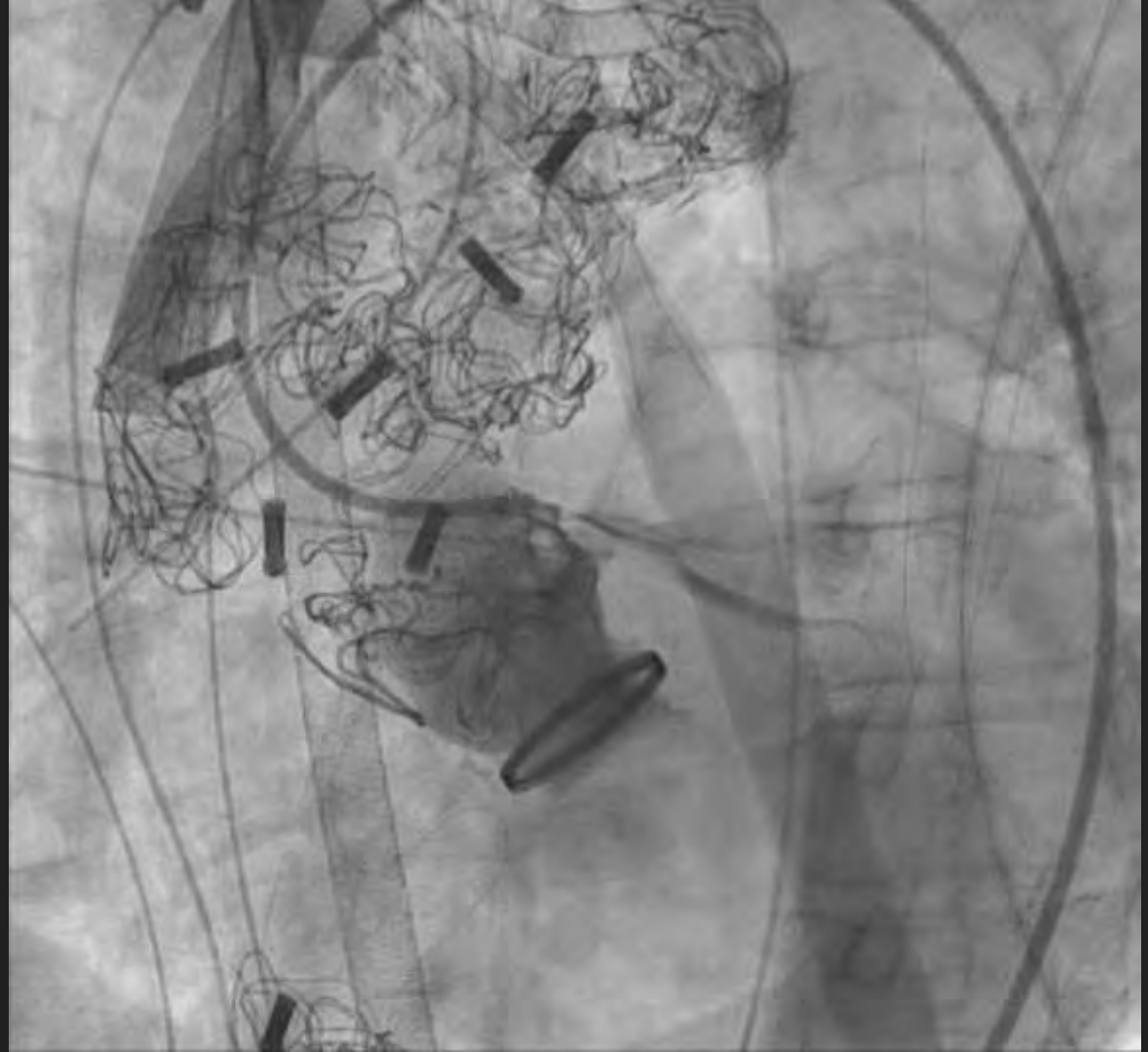
- IVUS was used to image LAD-LM. IVUS allowed us to measure the diameter of left main at 5.0mm. A Megatron 5.0x12mm stent was positioned in left main and deployed after stent position was confirmed angiographically. IVUS showed that stent was well apposed to the vessel wall and covered the ostium to distal left main but did not cover distal left main at bifurcation into LAD and LCX.

- IVUS showed us that there was dissection extending into LCX and showed a small dissection at distal edge of left main with extension into LAD.

- IVUS of LCX showed proximal LCX diameter was 4.5mm. An Onyx 4.5x12mm stent was positioned in proximal LCX overlapping with LM stent and deployed.

- Angiographic images showed well apposed stents. IVUS also showed well apposed stents in LM and LCX with no distal edge dissection after the LCX stent was placed. We then performed POBA to the distal LM-LAD

- Final angiographic images showed excellent flow in LAD and LCX.



- The next day she went back to the OR for washout and possible chest closure

- Intraop TEE showed severe biventricular failure with the left main distribution remaining akinetic and the aortic valve not opening despite high dose inotropes

- Patient was taken back to the ICU and family discussions ensued transitioning the patient to CMO, eventually passing away.

Diagnosis of Coronary Dissection:

- The diagnosis of coronary artery dissection with angiography alone can be arduous since an angiogram is a two-dimensional luminogram and does not image the arterial wall that is affected in coronary dissection

- Thus, advanced imaging techniques in addition to angiography are needed to accurately diagnose and guide management. Intravascular ultrasound (IVUS) and optical coherence tomography (OCT),a type of infrared imaging, are two such diagnostic modalities considered gold standard in accurately diagnosing coronary dissection

- IVUS allows for a more comprehensive assessment of the vessel and better appreciation of the extent of intramural hematoma as compared to OCT [1]

IVUS Guidance in Dissection:

- IVUS is the gold standard for evaluating plaque, lumen, and vessel dimensions [2]

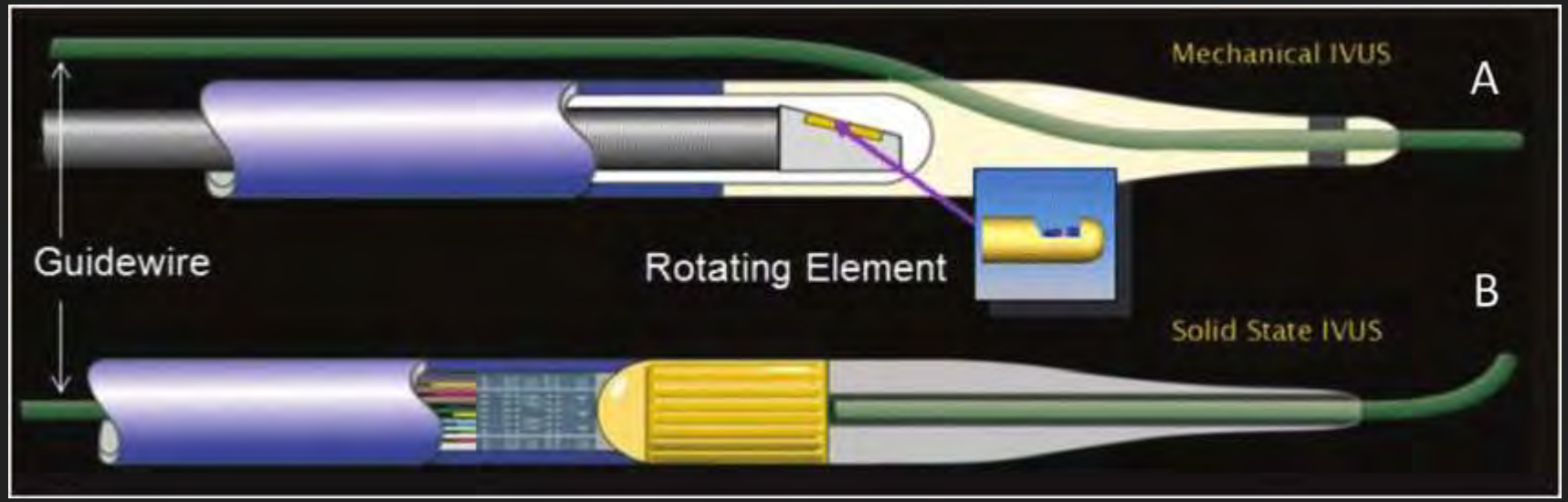
- IVUS has been shown to identify 4 to 6 times more dissections than angiography alone [3]

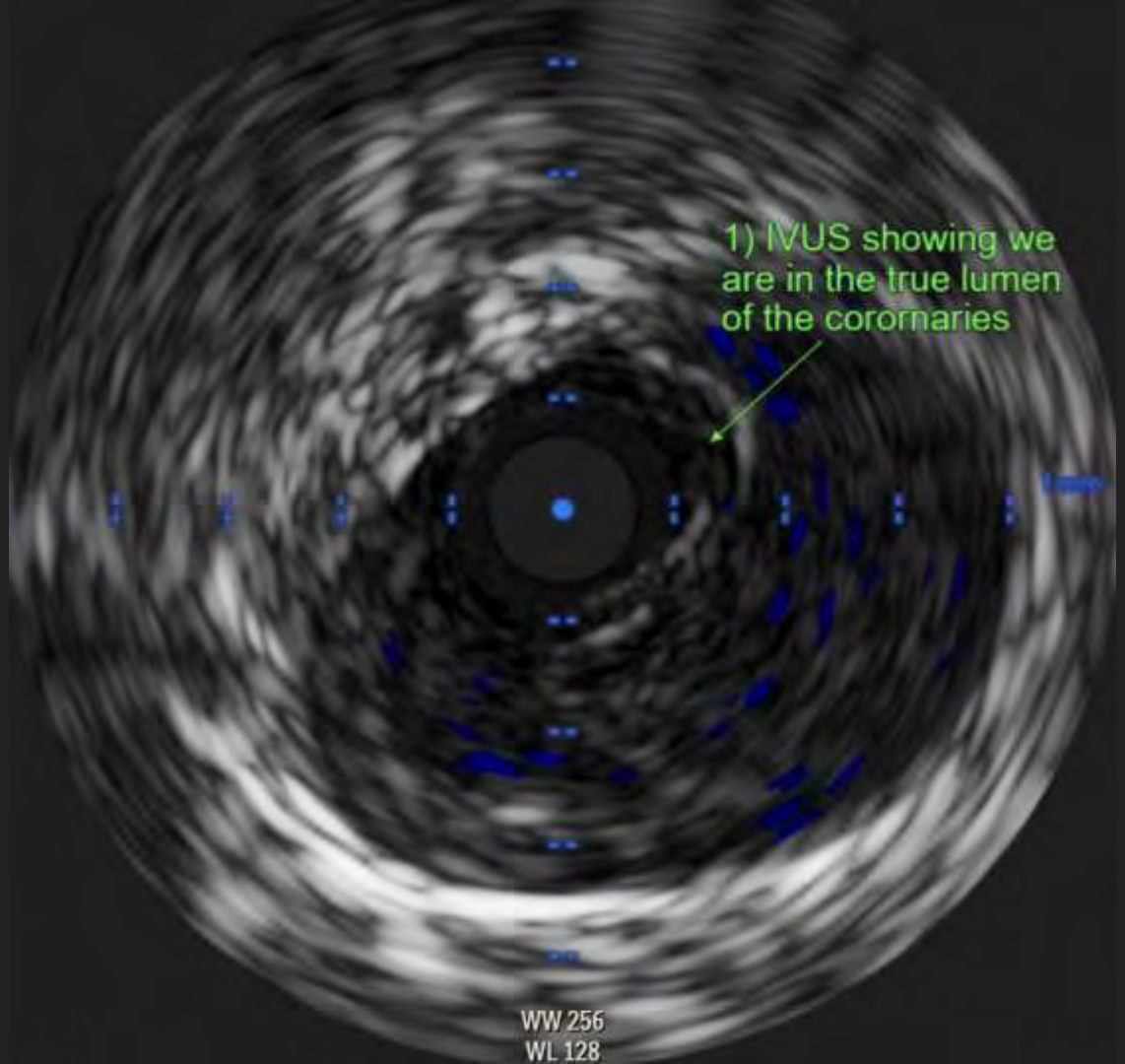
- IVUS can confirm our location in the true lumen before interventions

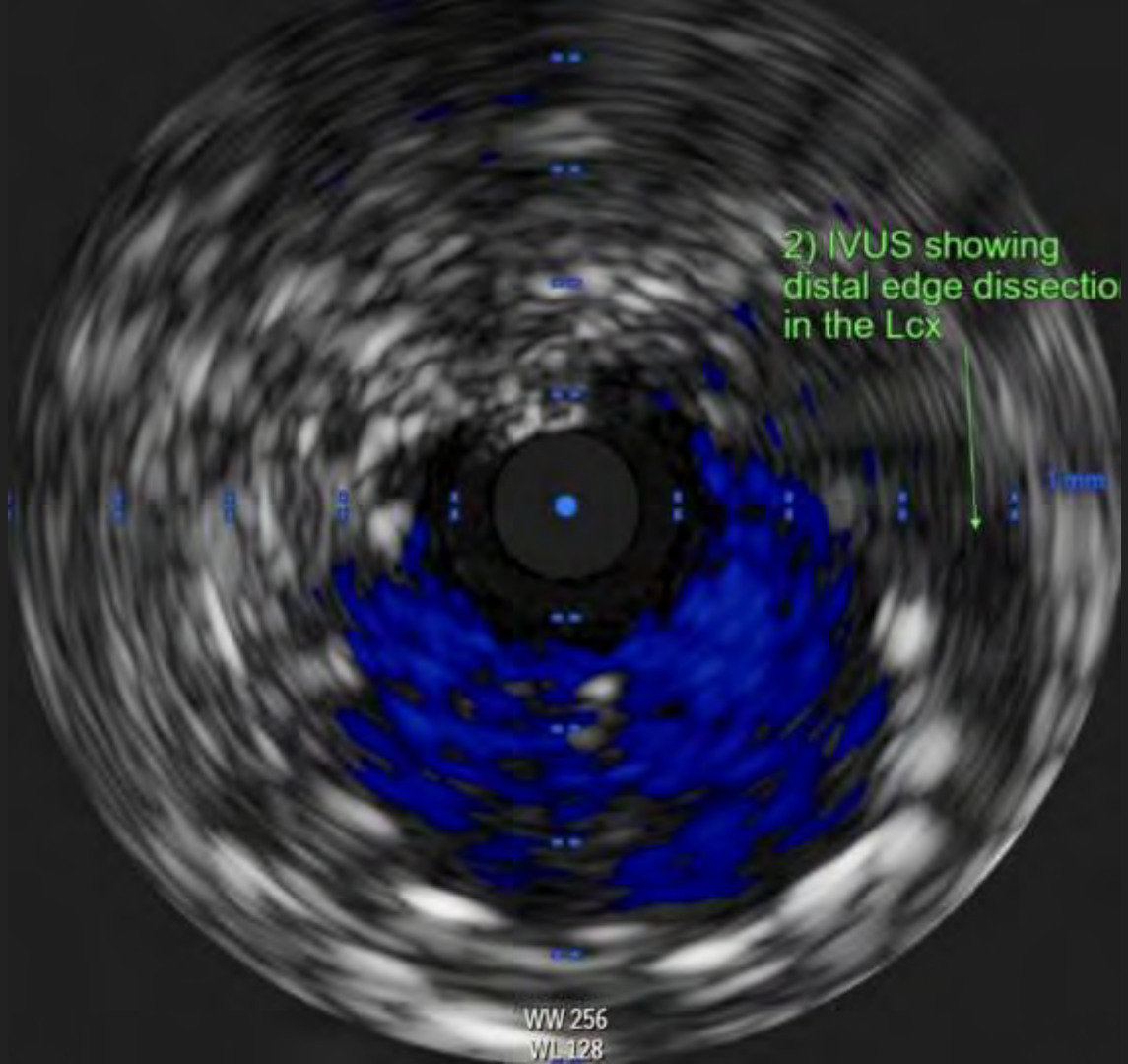
- IVUS also allows us to choose accurate stent sizes and allows for optimal implantation

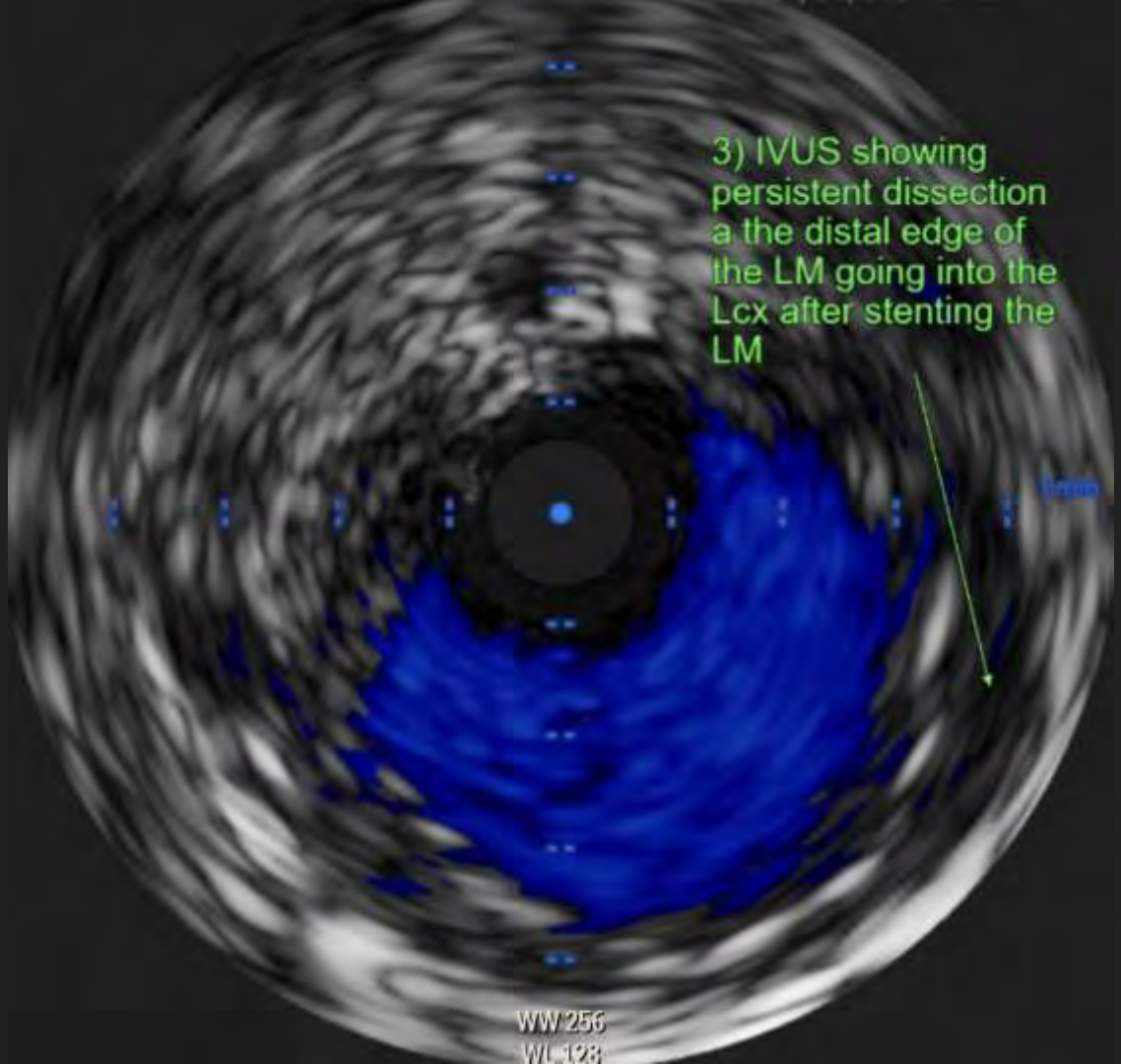
IVUS

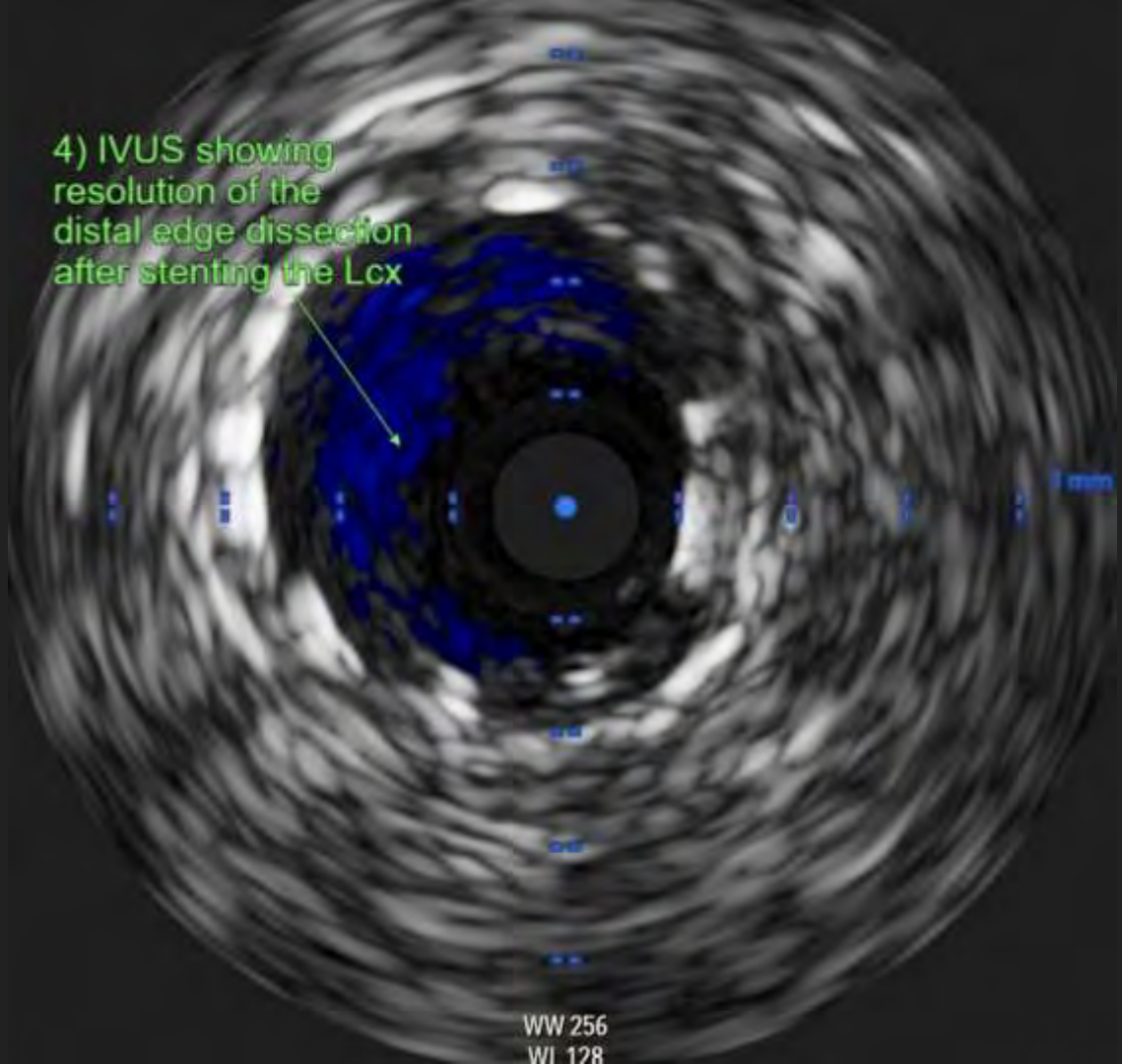
Even though studies have shown that IVUS-guided PCI is superior to angiography-guided PCI and reduces cardiovascular events, it is only used in roughly 15-20% of PCI cases in the United States, 12% in the UK but in 80% of cases in Japan. At UNMC, our ICs are highly trained in, and comfortable, using IVUS.




1) IVUS showing we are in the true lumen of the corornaries
WW 256
WL 128


2) IVUS showing
distal edge dissectio
in the Lcx
1 mm
WW 256
WL 128


3) IVUS showing persistent dissection a the distal edge of the LM going into the Lcx after stenting the LM
WW 256
WL 128


4) IVUS showing
resolution of the
distal edge dissection
after stenting the Lcx
WW 256
WL 128

Management Of Dissection:

- Conservative management: No intervention with repeat angiography 1 month later, suitable in otherwise stable patients - *usually in SCAD*

- Percutaneous intervention (PCI): Percutaneous approach is the preferred, and quickest, way to restore coronary flow and improve hemodynamics in cases of ongoing ischemia or hemodynamic instability

- Emergent CABG

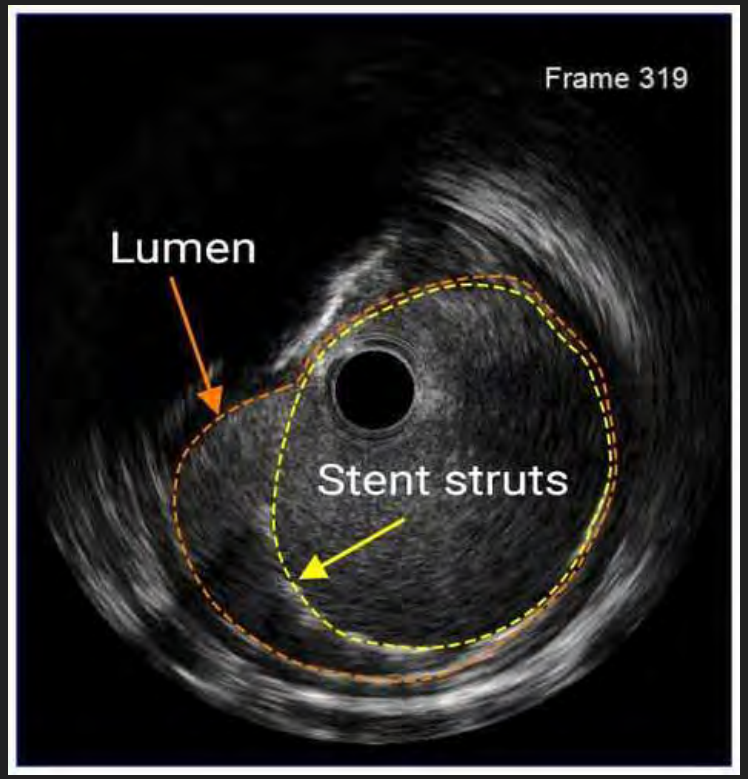
- Thrombolytic therapy

- Cardiac transplantation

MCQ: IVUS was performed after stent deployment, what abnormal IVUS finding is seen here?

A) Tissue Protrusion
B) Stent Edge Dissection
C) Stent Fracture
D) Stent Malapposition

ANSWER:



D) Stent malapposition

Stent strut malapposition is characterized by a lack of contact between stent struts and the underlying vessel wall after stent placement.

References:

- Saleem, S., Syed, M. A., Changal, K., Nuqali, A., & Sheikh, M. (2018). Percutaneous coronary intervention for iatrogenic right coronary artery dissection post bentall procedure: A case report and Minireview. Case Reports in Cardiology, 2018, 1–6. https://doi.org/10.1155/2018/3420721
- Yusuke Ikeuchi, Highlights•We experienced successful case of intravascular ultrasonography-assisted carotid artery stenting for iatrogenic carotid artery dissection.•Intravascular ultrasonography-assisted carotid artery stenting can be an effective treatment option for p, & Abstract Objective Intravascular ultrasonography (IVUS) is the gold standard for evaluating plaque. (2022, February 26). Successful intravascular ultrasonography-assisted carotid artery stenting for iatrogenic carotid artery dissection: Illustrative case. Interdisciplinary Neurosurgery https://www.sciencedirect.com/science/article/pii/S221475192200041X
- Shammas, N. w, & Shammas, J. (2019, August). Identifying and Repairing Dissections Using Intravascular Ultrasound: Are We There Yet?. Vascular Disease Management
- Cathsap

Thank you for listening