

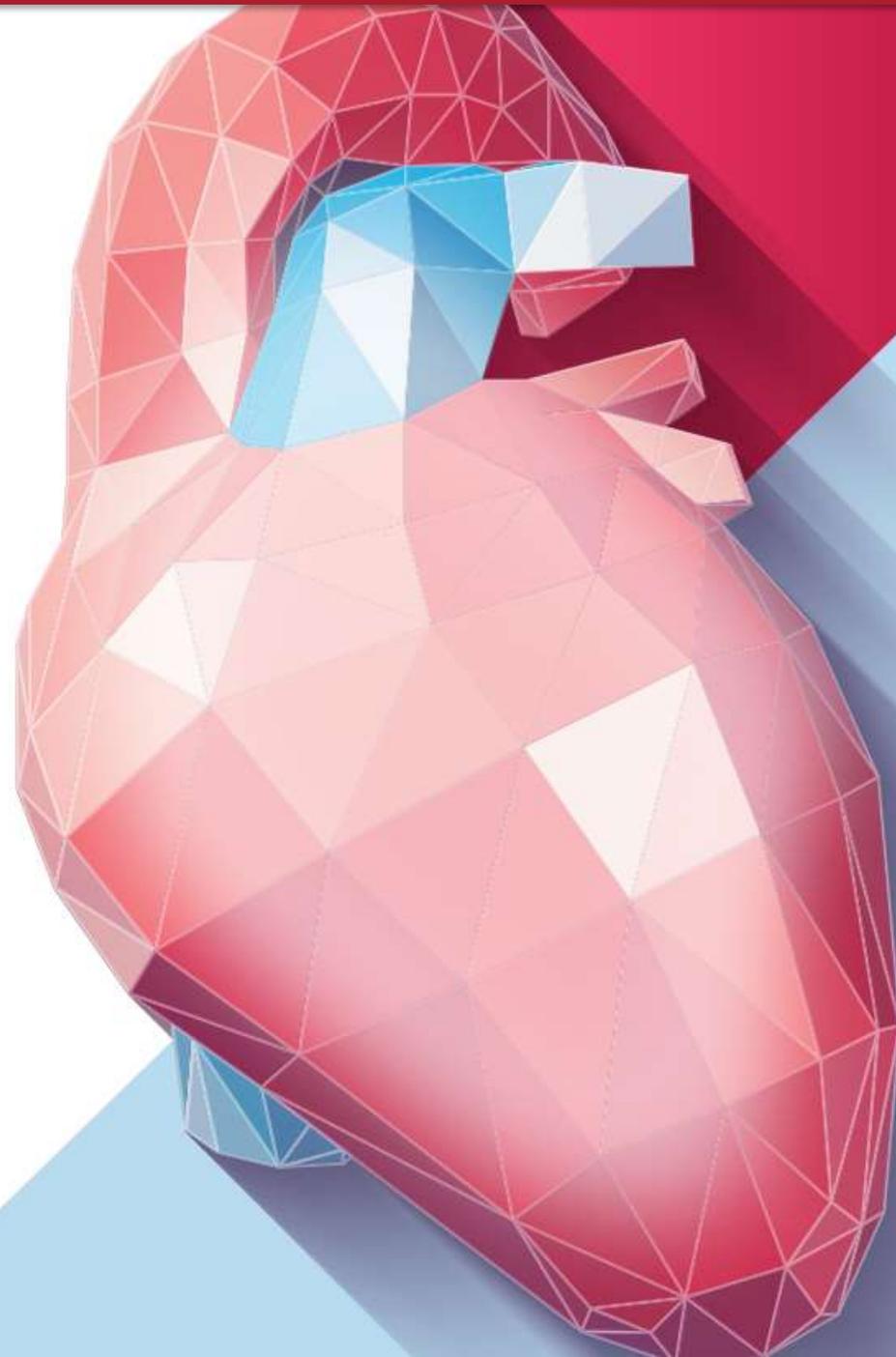
. Clinical Applications of Office Based Cardiac CT

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Duly Health and Care



Duly Health and Care

- Private, physician-owned, multispecialty practice of 1,000 physicians, with approximately 50 cardiologists
- Range of services across primary and specialty care, serving over two-thirds of Chicagoland suburbs
- Duly core philosophy: provide high quality care that is outpatient based and cost-effective for maximum value (sizeable Medicare Advantage population)



Introduction

- Chest pain particularly problematic
 - Triage nurses reflexively sent all patients with chest pain to local ERs where they were typically admitted for inpatient evaluation
 - Many of these patients did not have life-threatening chest pain; hospital admission unnecessary



Introduction

- Duly created a **Cardiac Evaluation Center (CEC)** for patients with non-life-threatening cardiac symptoms (including chest pain) to provide:
 - Rapid evaluation
 - Onsite testing
- By providing expedited outpatient evaluation, our goals were to:
 - Reduce healthcare costs and
 - Provide greater patient satisfaction



CLINICAL PRACTICE GUIDELINE: FULL TEXT

2021 AHA/ACC/ASE/CHEST/SAEM/ SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain



A Report of the American College of Cardiology/American Heart Association
Joint Committee on Clinical Practice Guidelines

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Cardiac Evaluation Center (CEC)

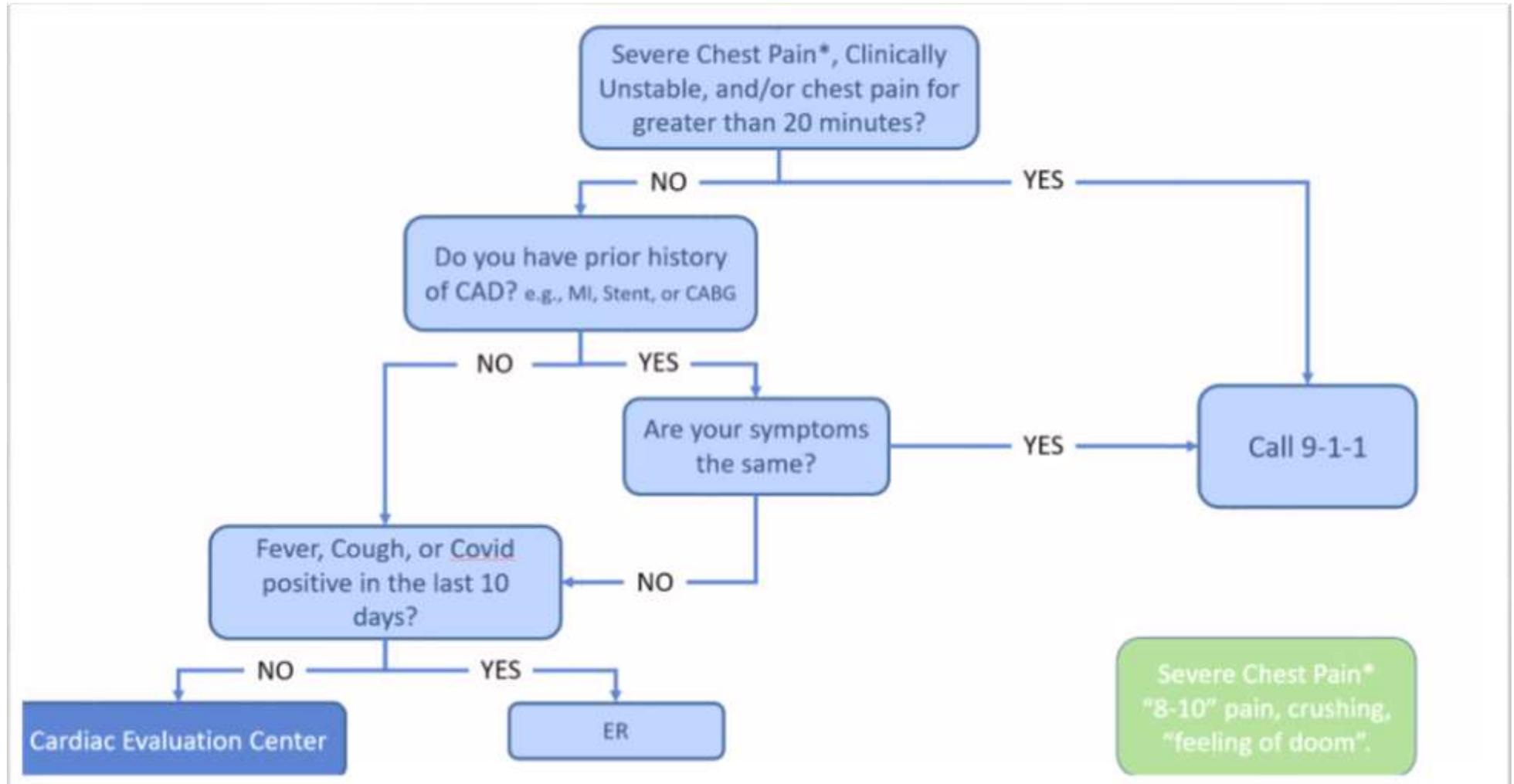
- Coronary CTA (CCTA) is the only test with a **class I recommendation and level A evidence** for the diagnosis and management of stable chest pain in patients without prior obstructive CAD
- 2021 ACC/AHA chest pain guidelines made it clear acquiring a cardiac CT scanner was vital for our practice
- Duly purchased a Arineta SpotLight scanner and opened the CEC in January 2022

Cardiac Evaluation Center (CEC)

- The Arineta SpotLight CT scanner was chosen for a variety of reasons:
 - Smaller form factor is space-efficient (great for ambulatory setting)
 - Smaller field-of-view (FOV) reduces radiation dose and limits visualization of noncardiac anatomy (dedicated cardiac CT)
 - Cost-efficient as compared to larger detector scanners
 - Provides excellent image quality



Duly chest pain guideline for CEC

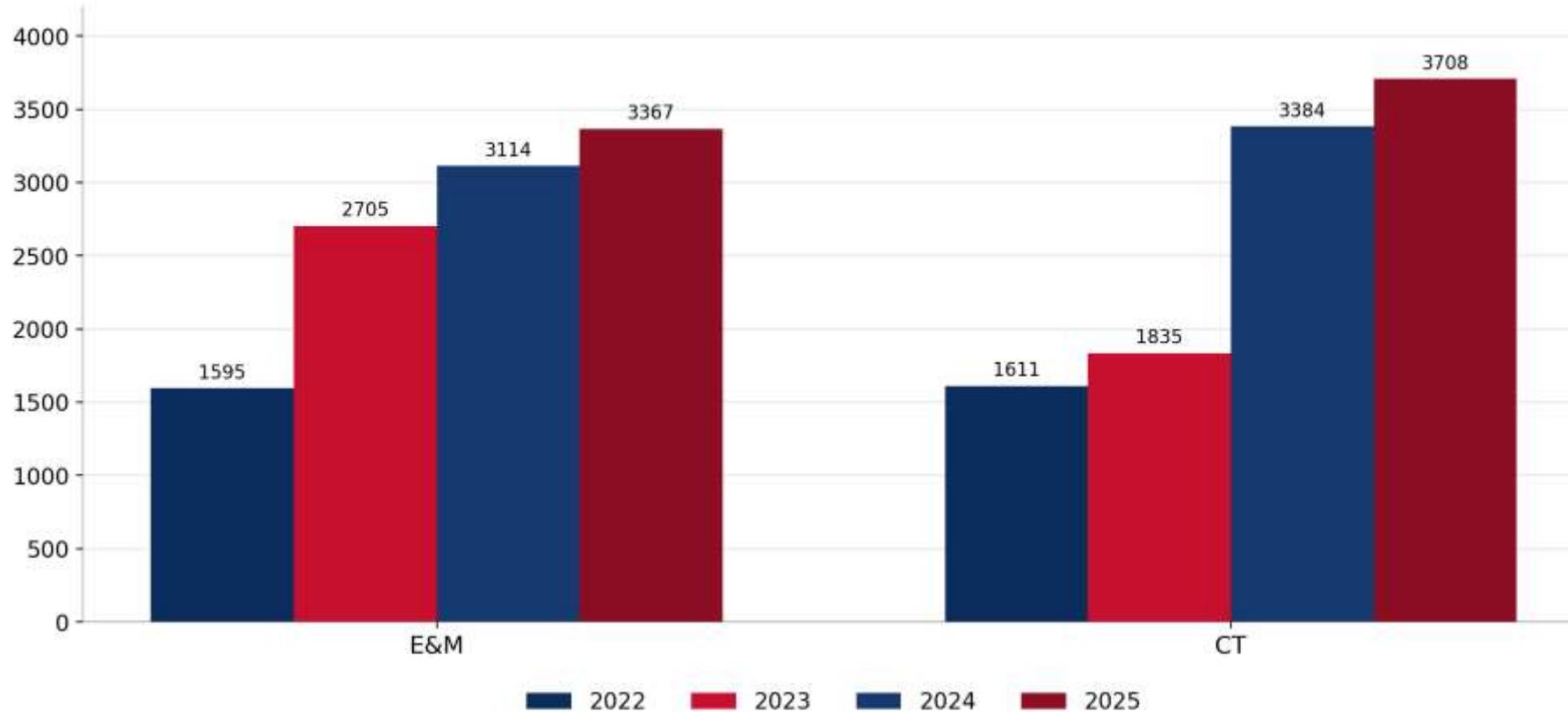


Cardiac Evaluation Center (CEC)

- Open Monday – Friday, 8 AM-5 PM
- 12 elective outpatient CTAs are scheduled daily
 - Coronaries, pulmonary veins/LAA, valves, thoracic aorta
- 5 CTA additional slots reserved for daily “walk-in” CCTAs
 - 2-3 walk-in CTAs are typical
- 16-28 patients seen daily at CEC

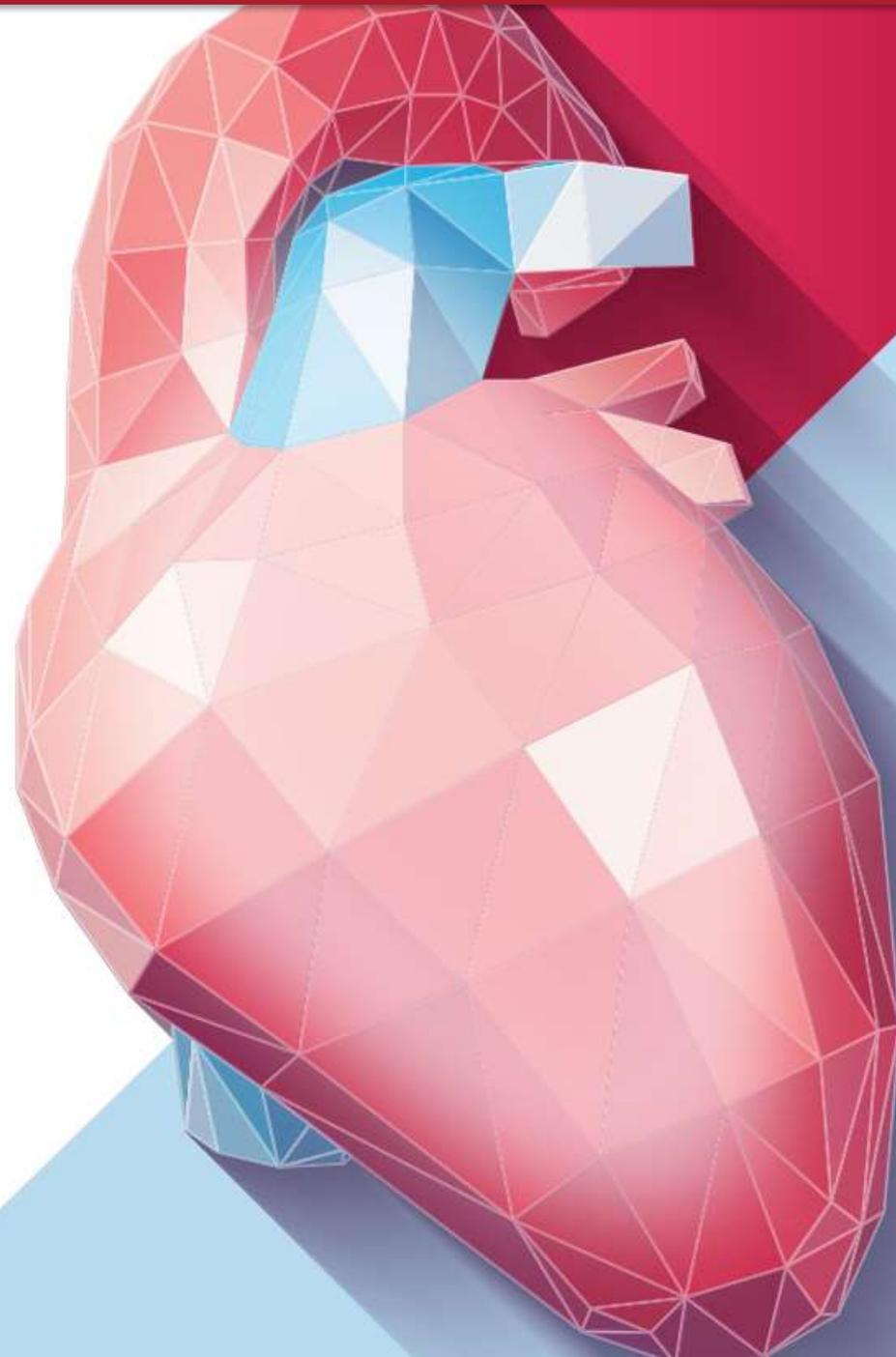
Cardiac Evaluation Center Volumes

2022 - 2025 CEC Volume



- Received the HeartFlow CT Quality award every quarter since opening (16 quarters consecutively); highest approval rate in our geography

Case Studies



Case 1

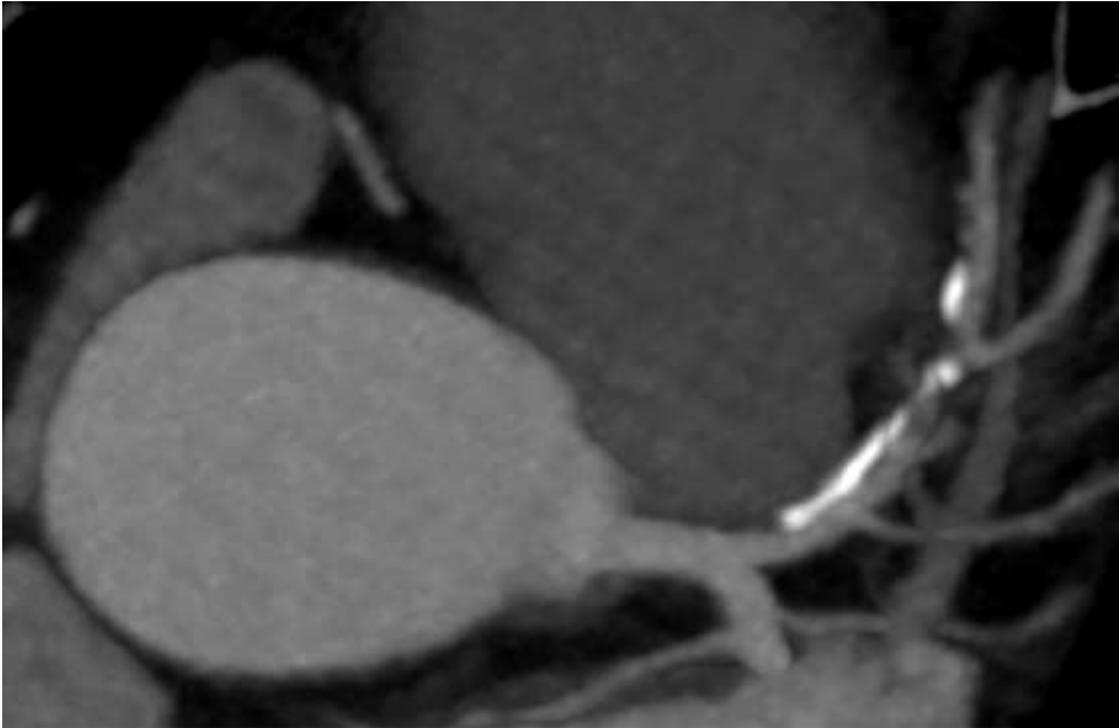
- 60 y/o M – well controlled HTN, HL, and exercises regularly
- His **mother died of an MI at age 61**
- Went on a family trip; walked 3-mile hike with incline
- After 1 mile walking uphill – he experienced dyspnea associated with chest tightness
- Rested for about 15 minutes with resolution of symptoms

Case 1

- Completed remainder of hike (downhill) without incident; symptoms did not return
- He contacted his PCP the next day; he was referred to CEC
- EKG on presentation showed sinus brady @ 53 bpm; labs (including troponin) normal
- CCTA performed 30 mins after arrival

Case 1

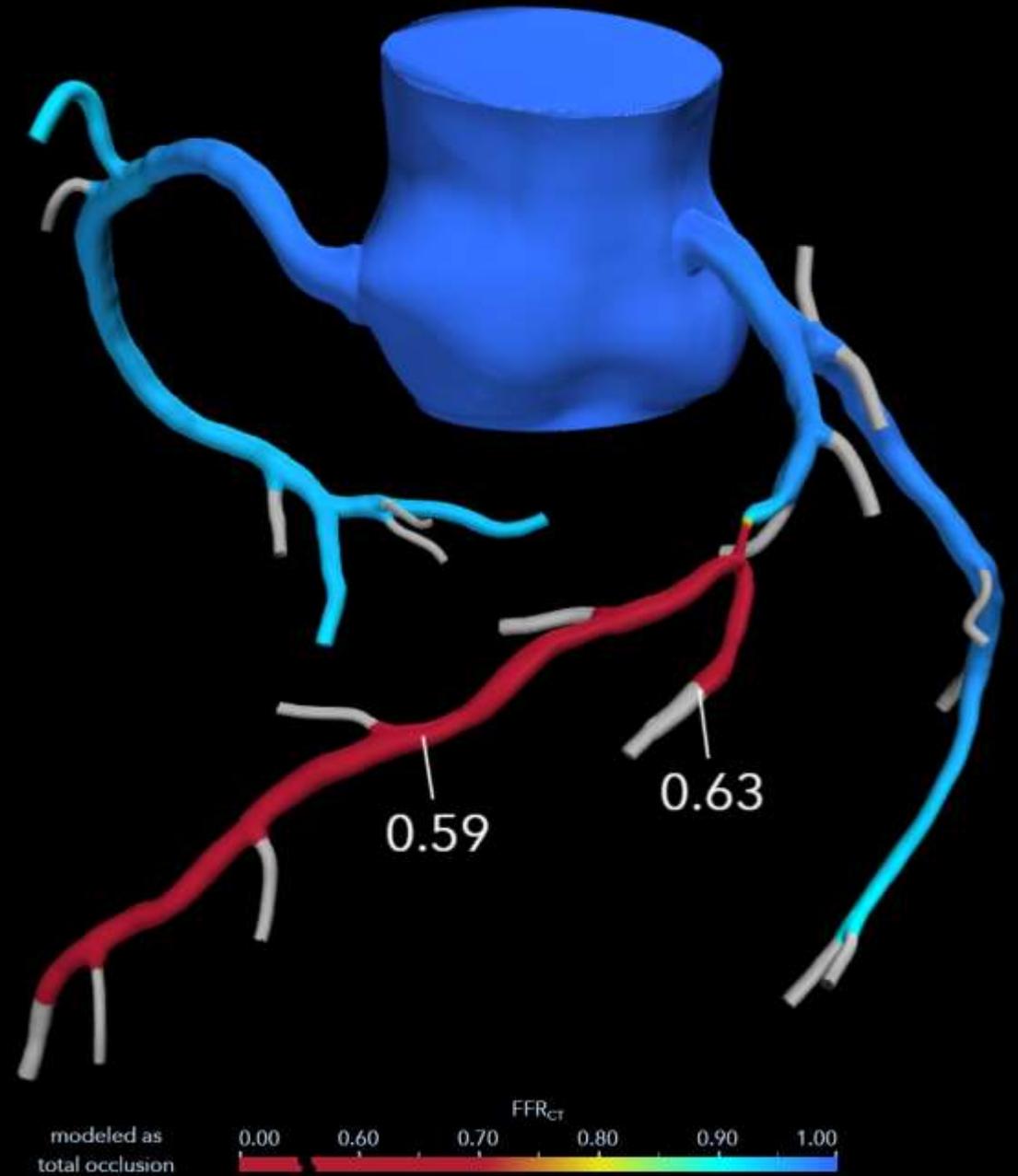
BMI 30 – HR 63 - 1 beat acquisition - .24 s rotation – 100 kV - 2.4 mSv



- CCTA showed obstructive (75-99% stenosis) eccentric mixed plaque involving the **proximal LAD**

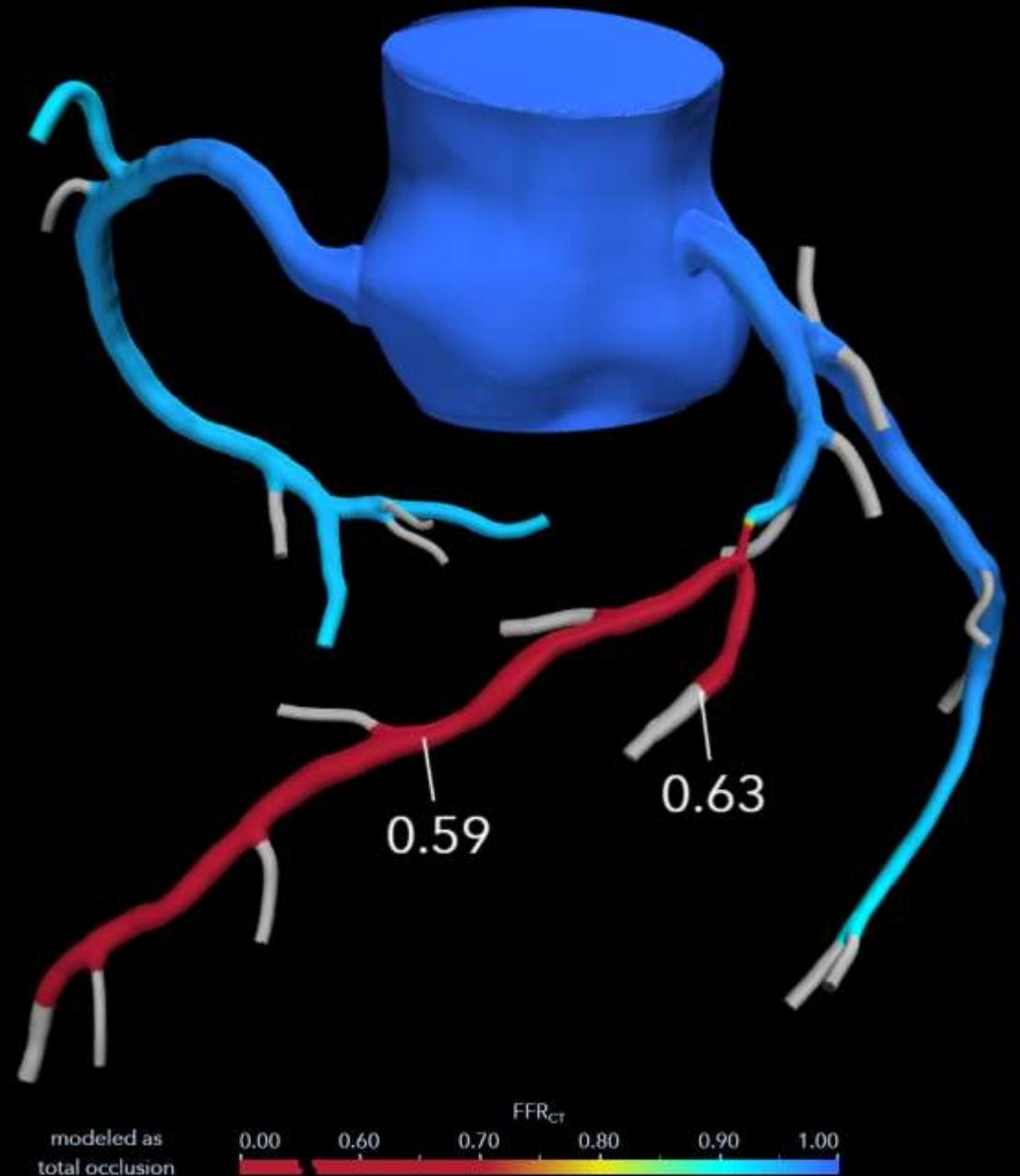
Case 1

- FFR-CT was also performed
- Confirmed presence of a **hemodynamically significant lesion in the proximal LAD** also affecting flow in the D2 branch



Case 1

- Patient was started on aspirin + nitrates (*no BB as HR was in 50s*) and discharged
- **Total visit time: 1 hour 45 mins**
- Underwent outpatient cardiac cath two days later which showed a 90% proximal LAD lesion
- Elective PCI was performed (DES to proximal LAD) and was discharged the same day



Case 2

- 27 y/o M without any obvious CV risk factors (*LDL 94, no DM2, nonsmoker*)
- **One month prior to presentation**, he caught **COVID-19**. Unvaccinated, moderate symptoms (*fevers, cough*) for 3 days.
- After recovery, he noted **intermittent chest discomfort that radiated to his left arm**. He described it as a substernal tightness. He only felt symptoms **with exertion** (*walking up a flight of stairs*); no symptoms at rest.
- Symptoms relayed to PCP – ordered exercise stress echo

Case 2

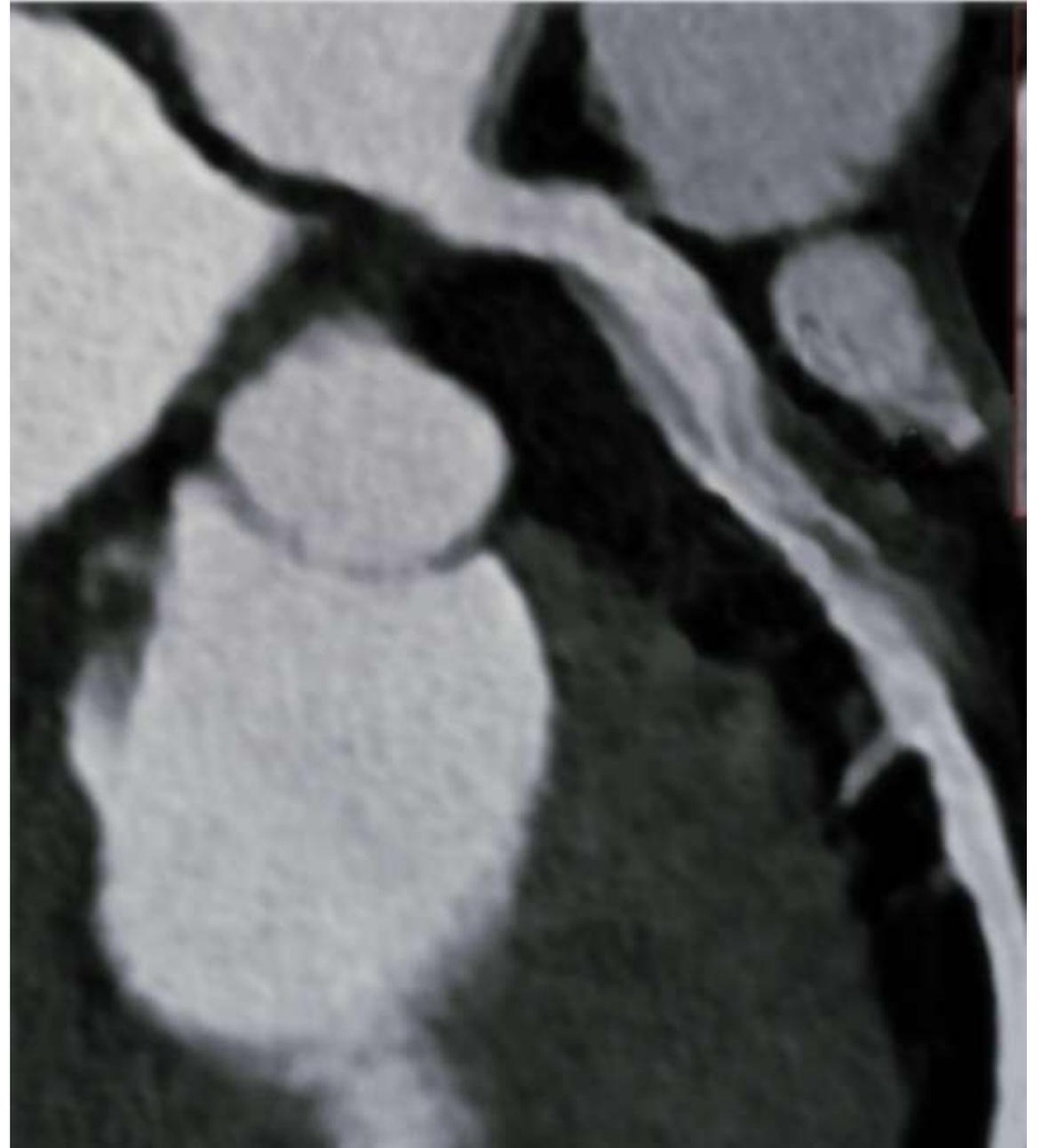
- Stress echo was performed and showed:
 - **EKG:** Normal resting EKG with **2.5 mm flat ST depression at 8 minutes into exercise**; resolved 5 minutes into recovery.
 - **Baseline echo:** Normal left ventricular systolic function and wall motion; EF 60%
 - **Stress echo: Exercise-induced hypokinesia** of the basal and mid anteroseptal, mid anterior, mid inferoseptal, apical inferior, apical anterior, and apical septal walls consistent with ischemia in the **proximal LAD distribution**.
 - **Symptoms: 6/10 chest pain** developed with stress that **completely resolved** in recovery.

Case 2

- Given the findings, the patient's PCP was contacted by reading cardiologist
- As EKG changes and symptoms had resolved completely, the patient was sent to the CEC for same day evaluation
 - If EKG changes or chest pain had persisted, the patient would have been sent to ER via EMS
- Upon arrival at the CEC, the patient remained pain free
 - EKG appeared normal
 - Labs (*including troponin*) were normal
- CCTA was performed an hour after arrival

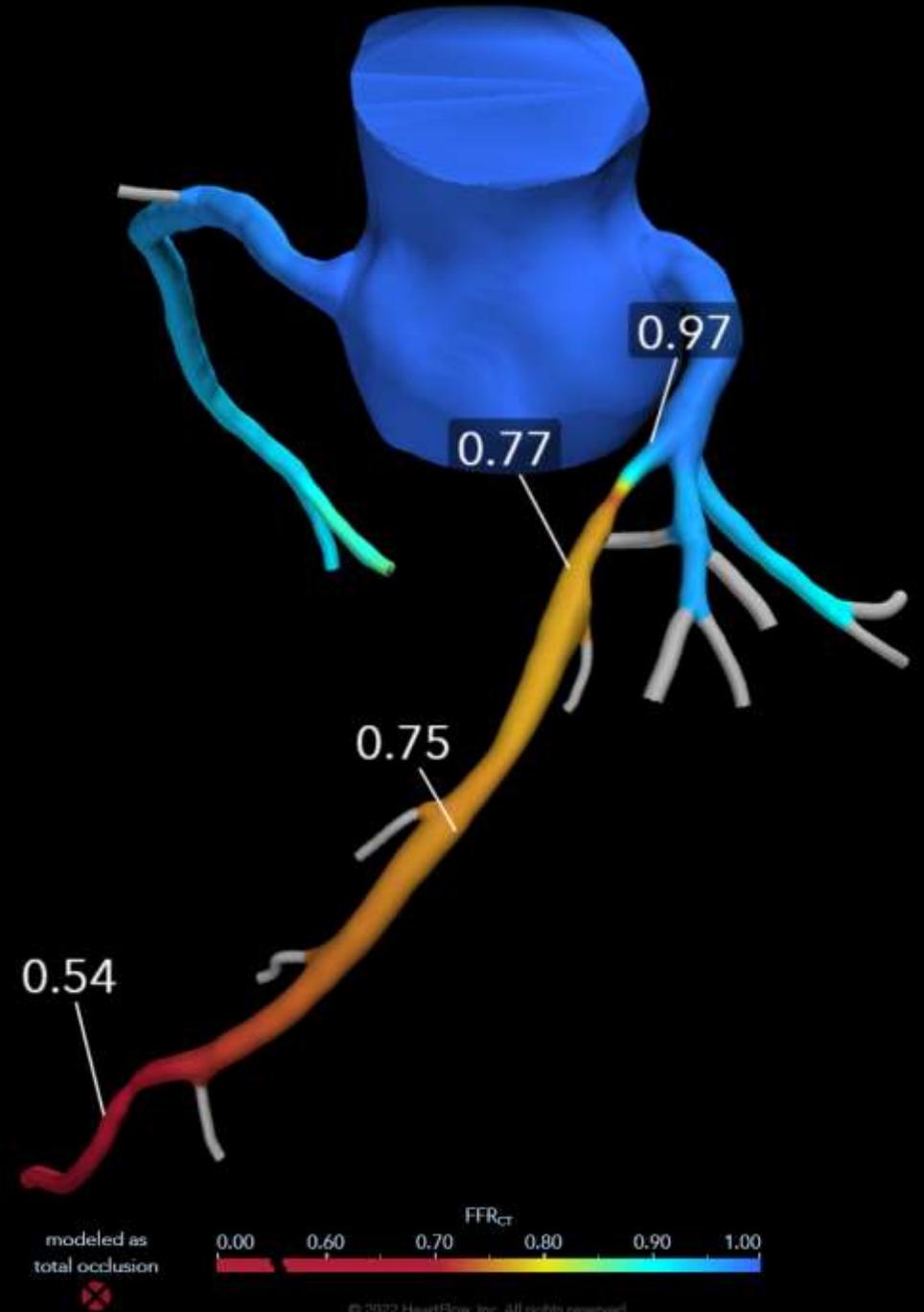
Case 2

- CCTA revealed a **coronary dissection** involving the proximal LAD
- No evidence of atherosclerosis or calcification



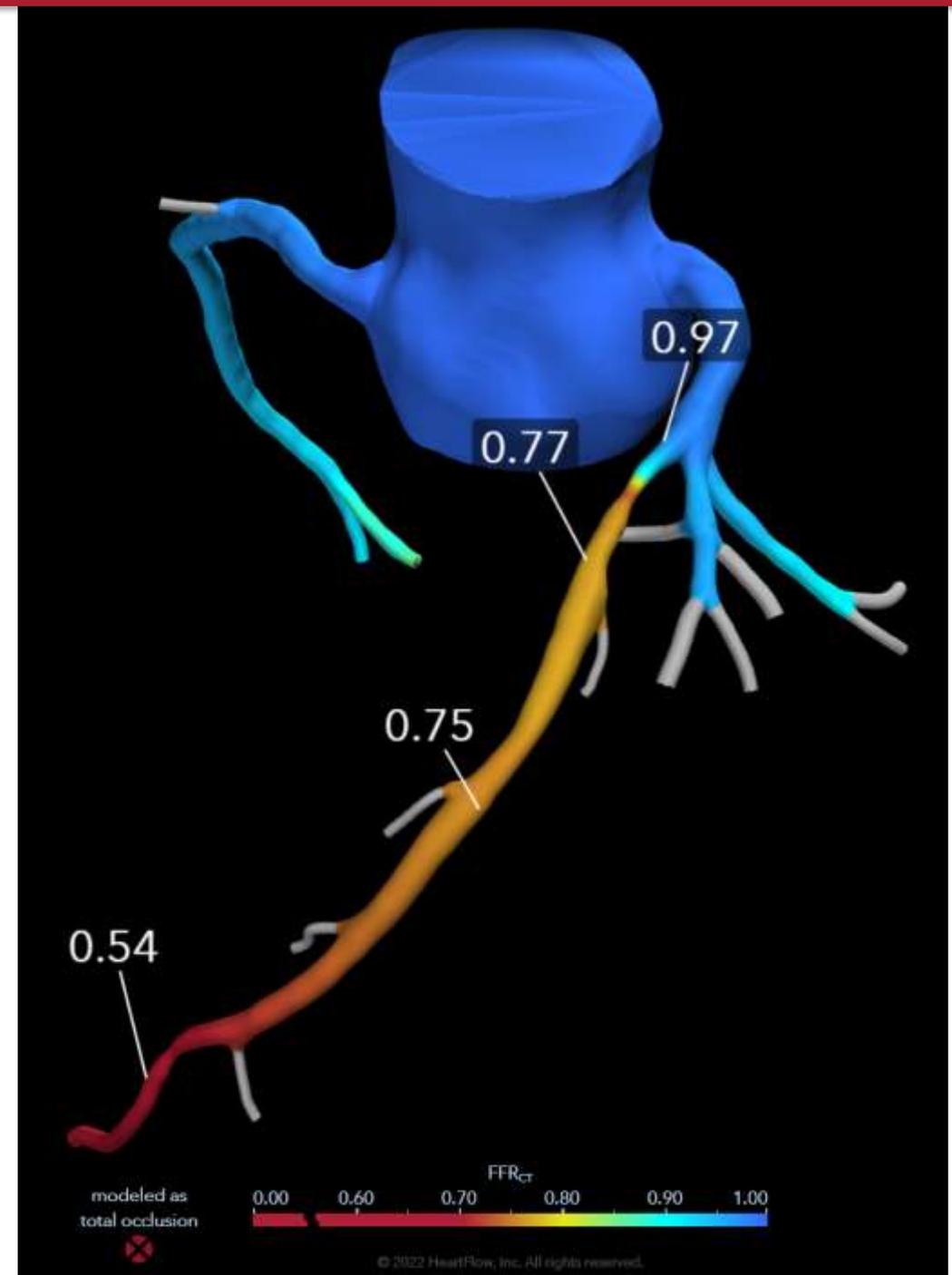
Case 2

- FFR-CT confirmed a hemodynamically significant lesion in the proximal LAD
- The patient was **directly admitted** to the hospital for further evaluation (*bypassing ER*)
- **Total time at CEC: 2 hours**



Case 2

- The patient was started on antiplatelet therapy + beta-blockade and observed for 48 hours
- Seen by CT surgery who agreed with conservative management
- Discharged home with instructions to avoid heavy exertion for 30 days
- Repeat CCTA a month afterwards showed **healing of dissection**; referred for phase II cardiac rehabilitation



Case 3

- 59 y/o M with history of elevated coronary calcium score (*800 in 2020*) has noted **intermittent substernal chest pain for the past two months**.
 - Primary trigger for pain is emotional stress.
- He has severe OA of R knee and has been less active; unable to exercise on treadmill
- Resting EKG showed new RBBB
- Lexiscan SPECT stress test ordered by PCP: no ischemia; EF 57%

Case 3

- Symptoms steadily increased in frequency over the next month -> sent to CEC
- Upon arrival at the CEC, labs (*including troponin*) were checked and were normal
- Given new RBBB and recent normal stress test, d-dimer was checked and was normal
- **CCTA was performed 45 minutes after arrival**

Case 3

- CCTA showed moderate diffuse disease in the proximal and mid LAD with a **severe stenosis in the very distal/apical LAD**
- Nonobstructive disease was noted in the LCx and RCA



BMI 32
HR 63
1 beat acquisition
0.24 s rotation
100 kV
2.1 mSv

Case 3

- FFR-CT confirmed hemodynamically significant disease in the very distal / apical LAD (FFR = 0.64)



Case 3

- Above findings were discussed with patient; aggressive medical therapy recommended given distal ischemia
- The patient was started on beta-blockers and nitrates; discharged with outpatient follow-up->symptoms improved a week later
- **Total visit time: 90 mins**



Case 4

- 67 y/o M with **morbid obesity (BMI 54)**, DM2, HTN, HL
- He reports a mild intermittent chest pressure has been going on for the past year; occurs at random (with or without activity)
- He also notes chronic DOE that he attributes to obesity and inactivity
- In 2017, he had a Lexiscan SPECT stress test done which reported anterior wall ischemia; cardiac catheterization showed mild diffuse nonobstructive CAD

Case 4

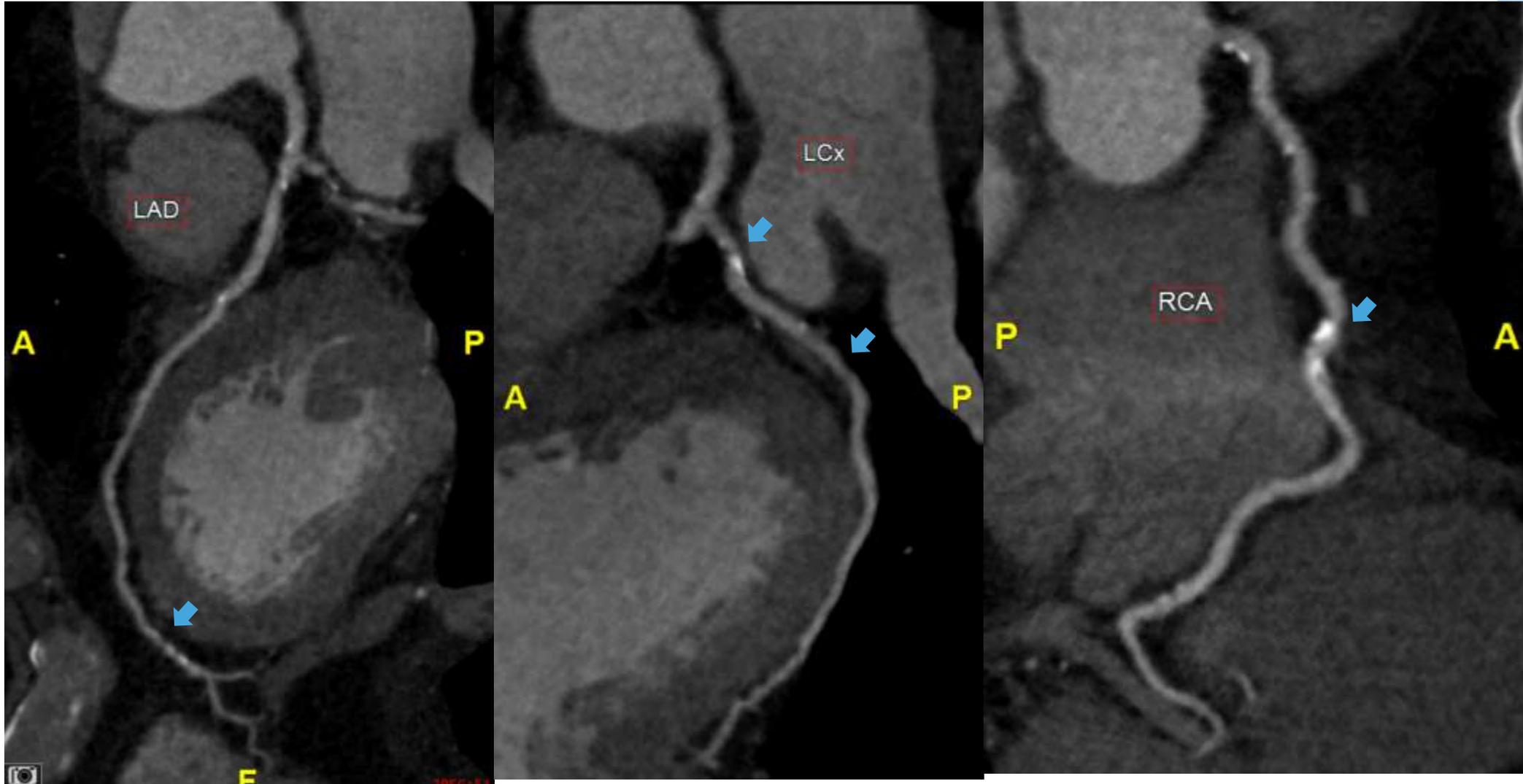
- He was referred to our CEC for evaluation
- Upon arrival, he was noted to have a BP 130/80 and **HR 88**
- Labs showed negative troponin; EKG showed low voltages with nonspecific T-wave abnormalities
- For scanning large patients (BMI>35), we reduce rotation speed from 0.24 to **0.27 ms** and use **120 kV (generally don't use 140 kV)**
- To compensate for loss of temporal resolution, we try to target HR <65 (**ideally ≤ 60 bpm**)

Case 4

- He was discharged (50 minutes in CEC) and planned to **return the next day with pre-medication for rate control**
- Prescribed metoprolol tartrate 100mg the night before and the morning of his scan
- His HR on arrival now was 74 bpm
- He was given an additional 100mg of metoprolol tartrate and 15mg oral ivabradine
- Two hours later; HR was 60 bpm
- CCTA was performed.

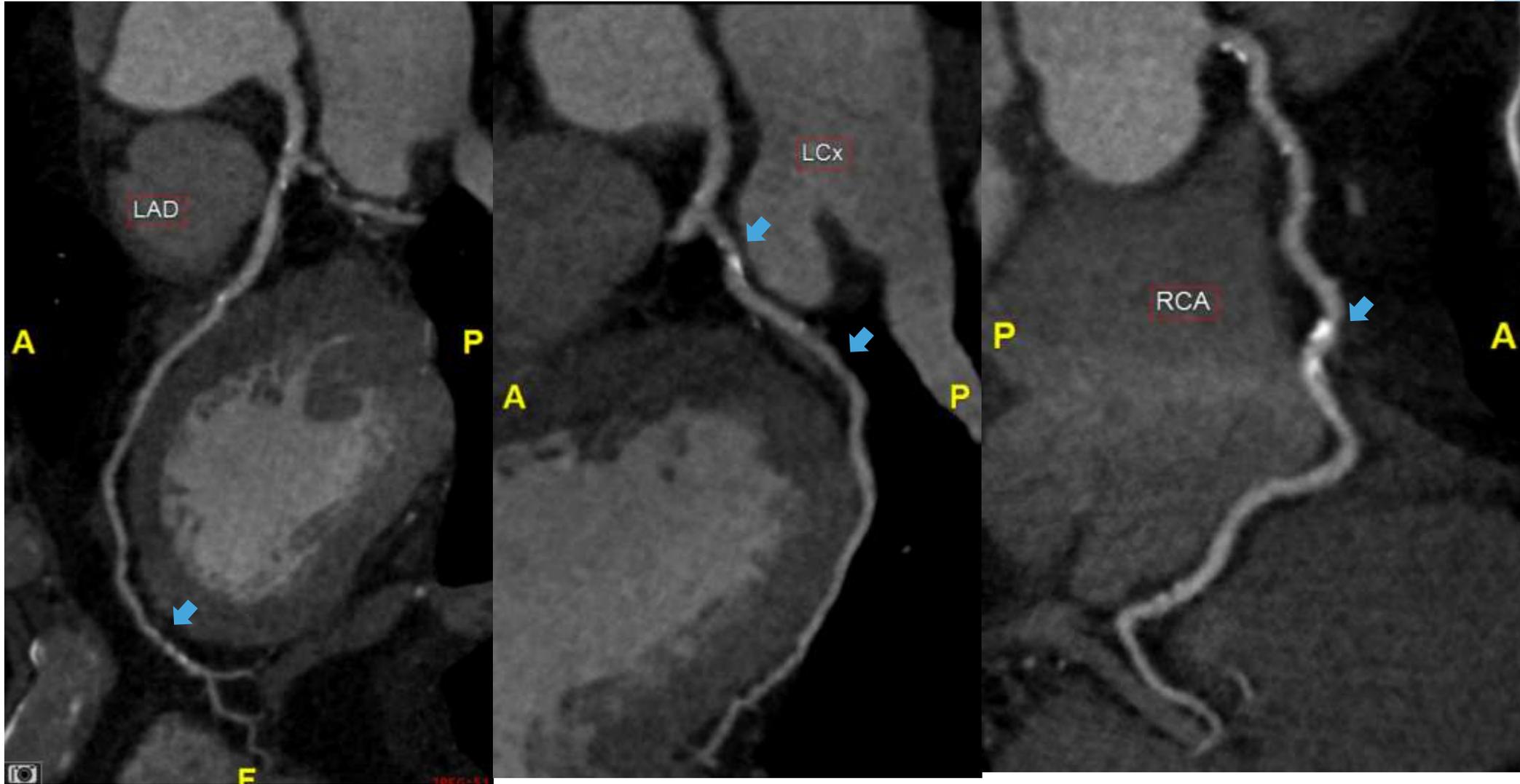
Case 4

- LM:
 - Mild distal disease
- LAD:
 - Possibly significant disease (50-69%) in distal LAD and D2
 - Mild disease in prox and mid LAD



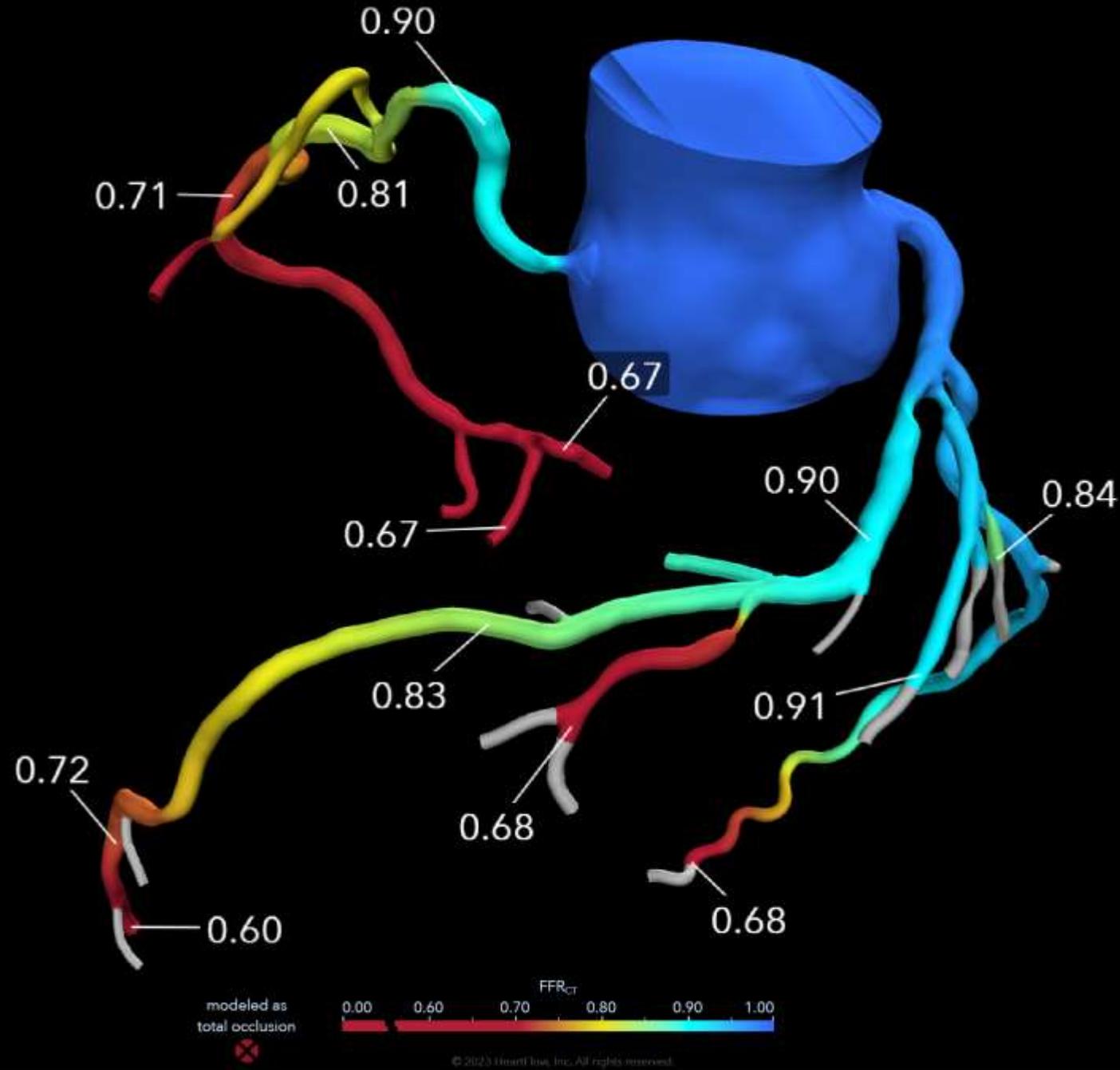
Case 4

- LCx:
 - Possibly significant disease (50-69%) in prox LCx and prox OM1
- RCA:
 - Possibly significant in mid RCA
 - Mild disease in prox and distal RCA



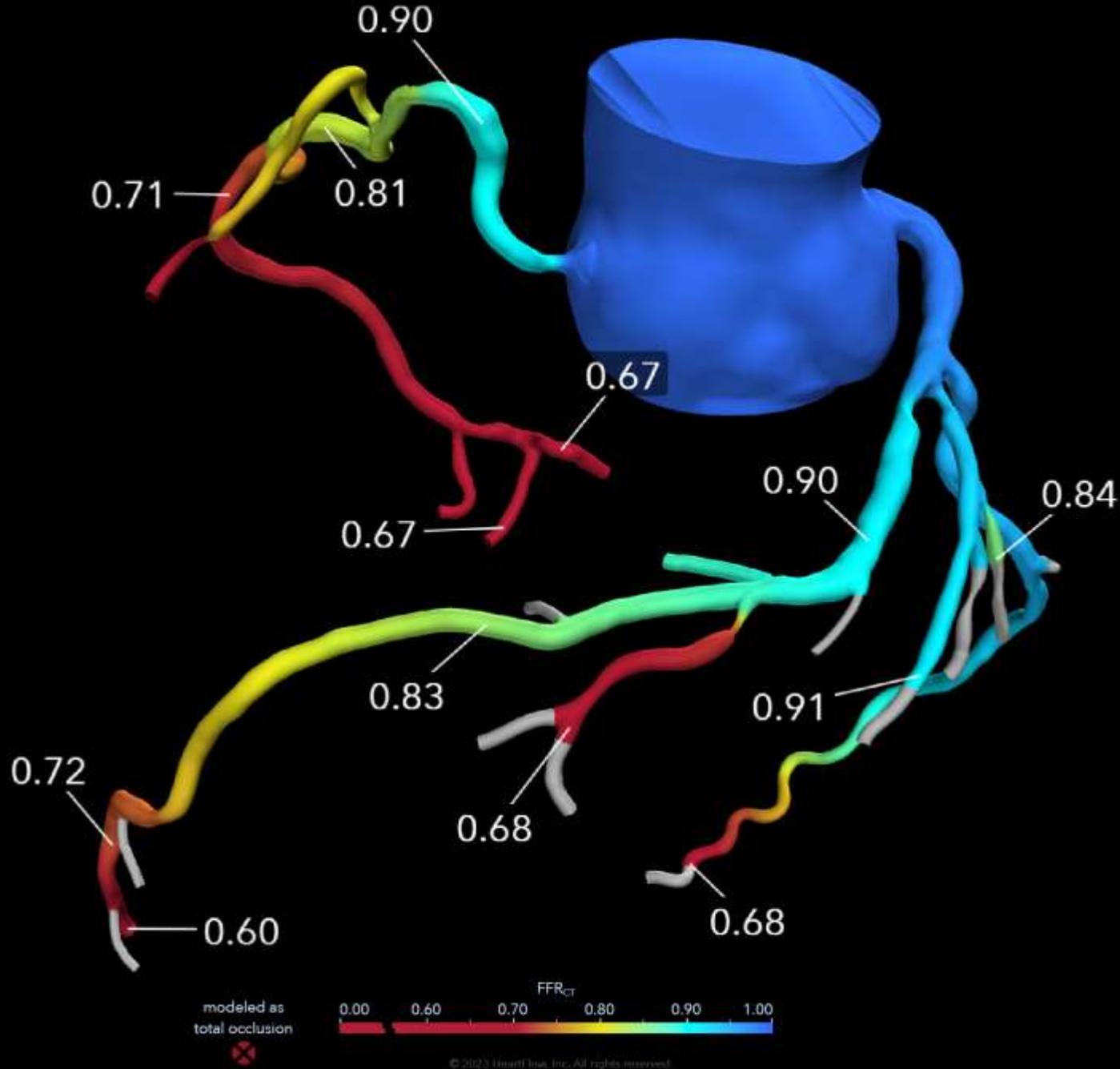
Case 4

- FFR-CT showed hemodynamically significant lesions in the:
 - Mid RCA
 - Ostial D2
 - Distal LAD and distal OM2



Case 4

- He subsequently underwent cath
- 80% mid RCA; 90% ostial D2; 80% distal LAD and distal OM2
- PCI (DES) to the mid RCA; POBA of the ostial D2
- Medical therapy of the distal LAD and distal OM2 lesions



Case 5

- 74 y/o F with presenting with CP
- She has RA, HTN and HL; **calcium score of 900 back in 2005**->has been on aggressive GDMT since that time
- She has longstanding GERD which manifests as heartburn after eating
- Over the past couple months has noted heartburn without eating and sometimes with exertion

Case 5

- She was referred to the CEC for further evaluation (Friday afternoon); daughter is a physician
- EKG was normal; troponin was also normal
- HR was 58 on arrival
- CCTA was performed

Case 5

- CCTA showed heavy calcification of the distal LM extending into the ostial LAD and LCx; also in proximal LAD
- Could not accurately quantify stenosis in LM and proximal LAD
- Nonobstructive disease (25-49%) in mid LAD, mid LCx and proximal and mid RCA

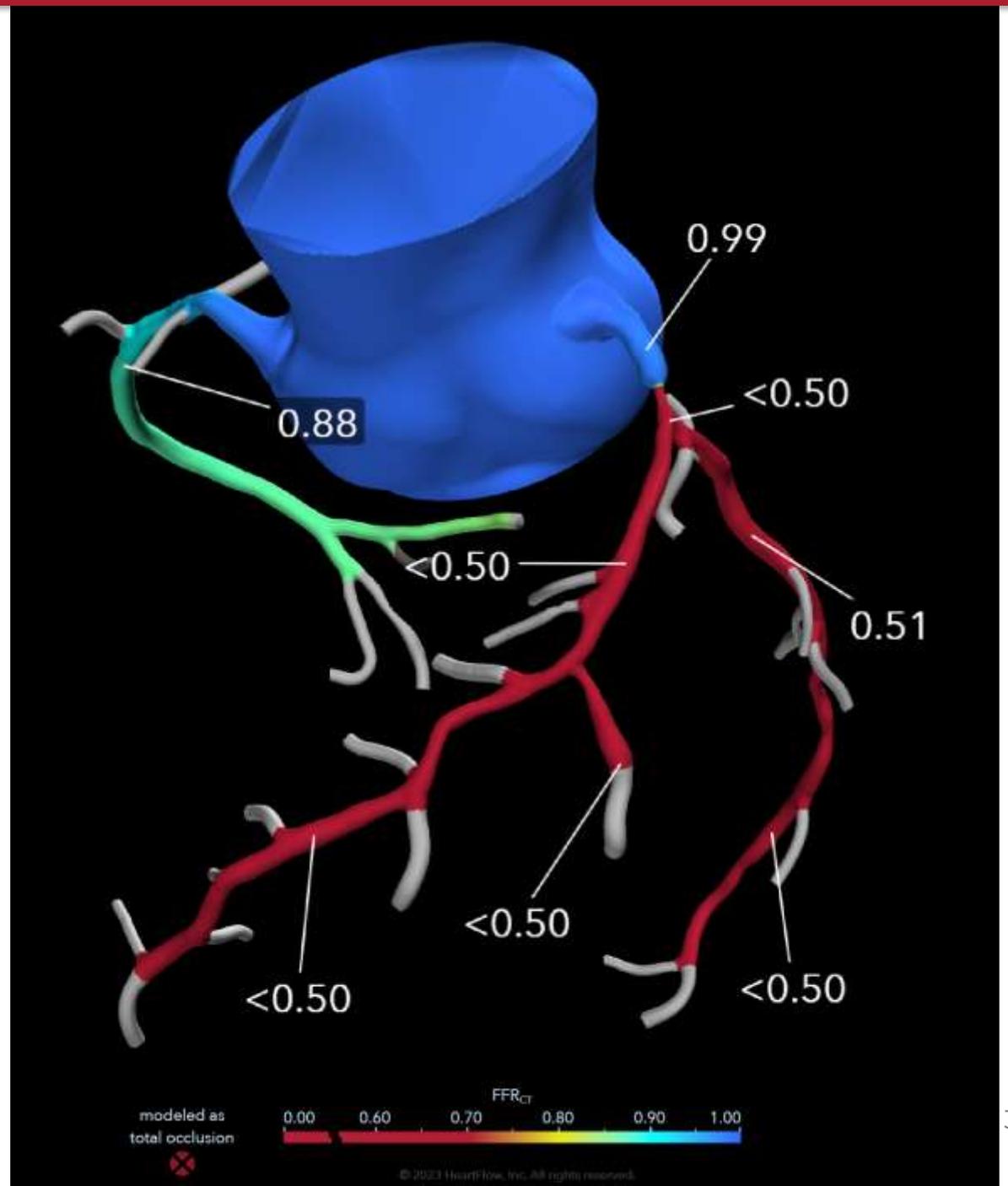


BMI 24
HR 58
1 beat acquisition
0.24 s rotation
100 kV
1.8 mSv



Case 5

- FFR-CT however demonstrated severe stenosis in the distal LM
- RCA confirmed to have no hemodynamically significant disease



Conclusion

- Our CEC allows us to offer expedited outpatient evaluation of heart disease
- Chest pain has been a major focus of the CEC; CCTA is our preferred first-line test in patients without prior obstructive CAD (*in line with 2021 ACC/AHA guidelines*)
- Our Arineta SpotLight CT scanner is the cornerstone of our Cardiac Evaluation Center
- We went live with our second SpotLight CT scanner on Feb 2, 2026 in our South region. Plans to purchase a third scanner in 2028.





Q&A

www.arineta.com

