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CARDIAC PET

This is why we do Cardiac PET: Comparison of SPECT and PET in the Same Patient

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Case Summary

A 60-year-old patient with recurring exertional angina undergoes Cardiac PET perfusion with myocardial blood flow after a normal exercise SPECT study. Cardiac PET indicated single vessel LAD ischemia confirmed at catheterization. This case demonstrates superior diagnostic accuracy of PET over SPECT

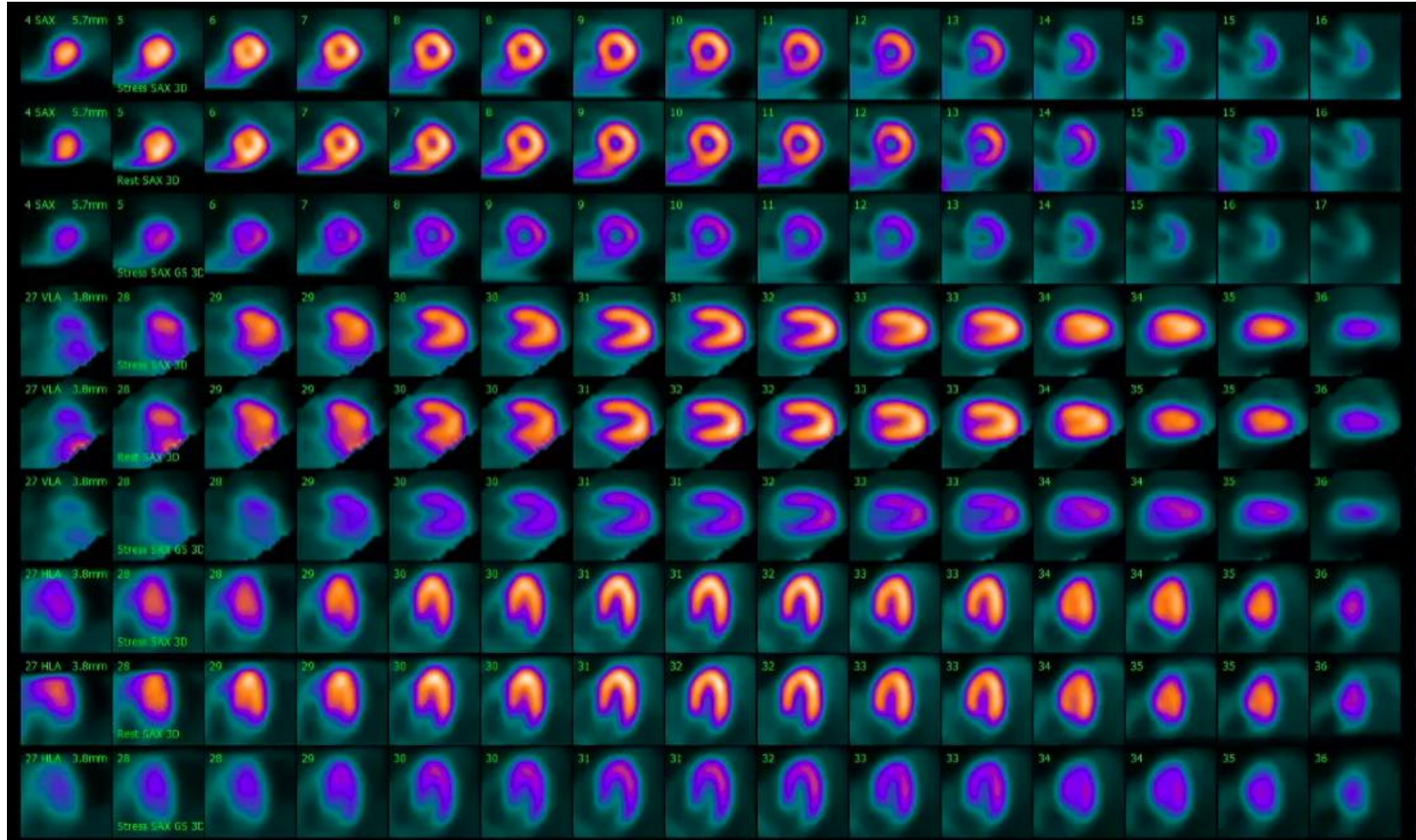


Case History

- 60-year-old male patient with a history of exertional chest pain undergoes cardiac SPECT study. Cofactors of hypertension, diabetes, hyperlipidemia
 - No symptoms
 - 1-2 mm ST segment depressions
 - Achieved >85% mphr
 - SPECT study normal with normal left ventricular EF
- Because of continued symptoms, pharmacologic PET with myocardial blood flow was ordered.



SPECT perfusion and gated images



PET Protocol

- Stress agent: Regadenoson
- Stress ECG: 1.0 mm ST-segment depression (V4, V5, and V6)
- Stress symptoms: shortness of breath, chest discomfort, chest pain
- Rest and stress HR: Rest: 95 BPM, Stress: 123 BPM
- Rest and stress BP: Rest, 153/88 mmHg, Stress: 147/67 mmHg
- Isotope and administered activity: Rubidium-82 (need rest, stress dose): Rest: 39.7 mCi, Stress: 39.8 mCi
- Camera GE PET/CT Discovery DSTE

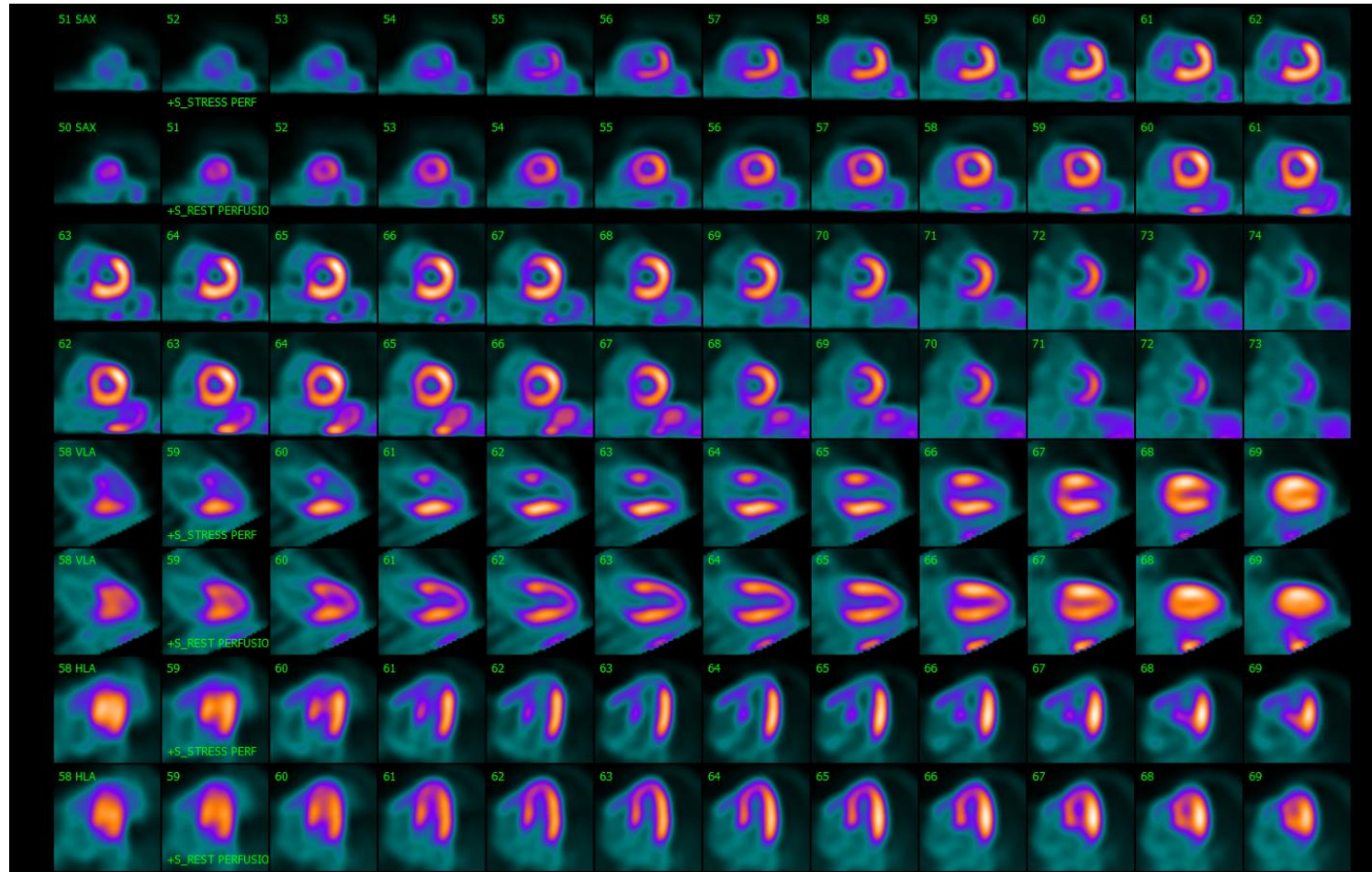


Quality Control

- Good registration, rest/stress
- No motion artifact
- QC for myocardial blood flow normal



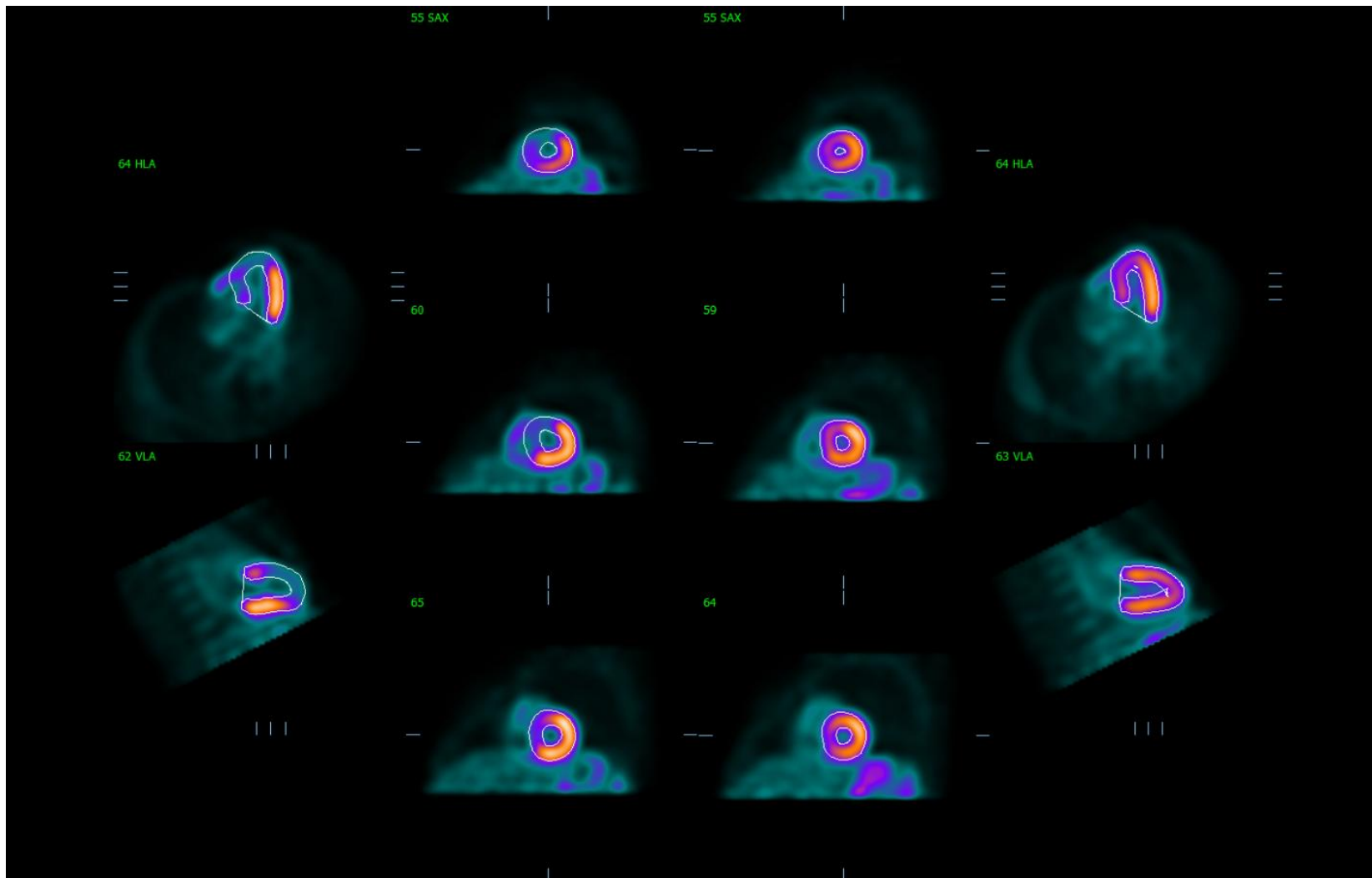
PET Perfusion Images



TID Ratio
1.41



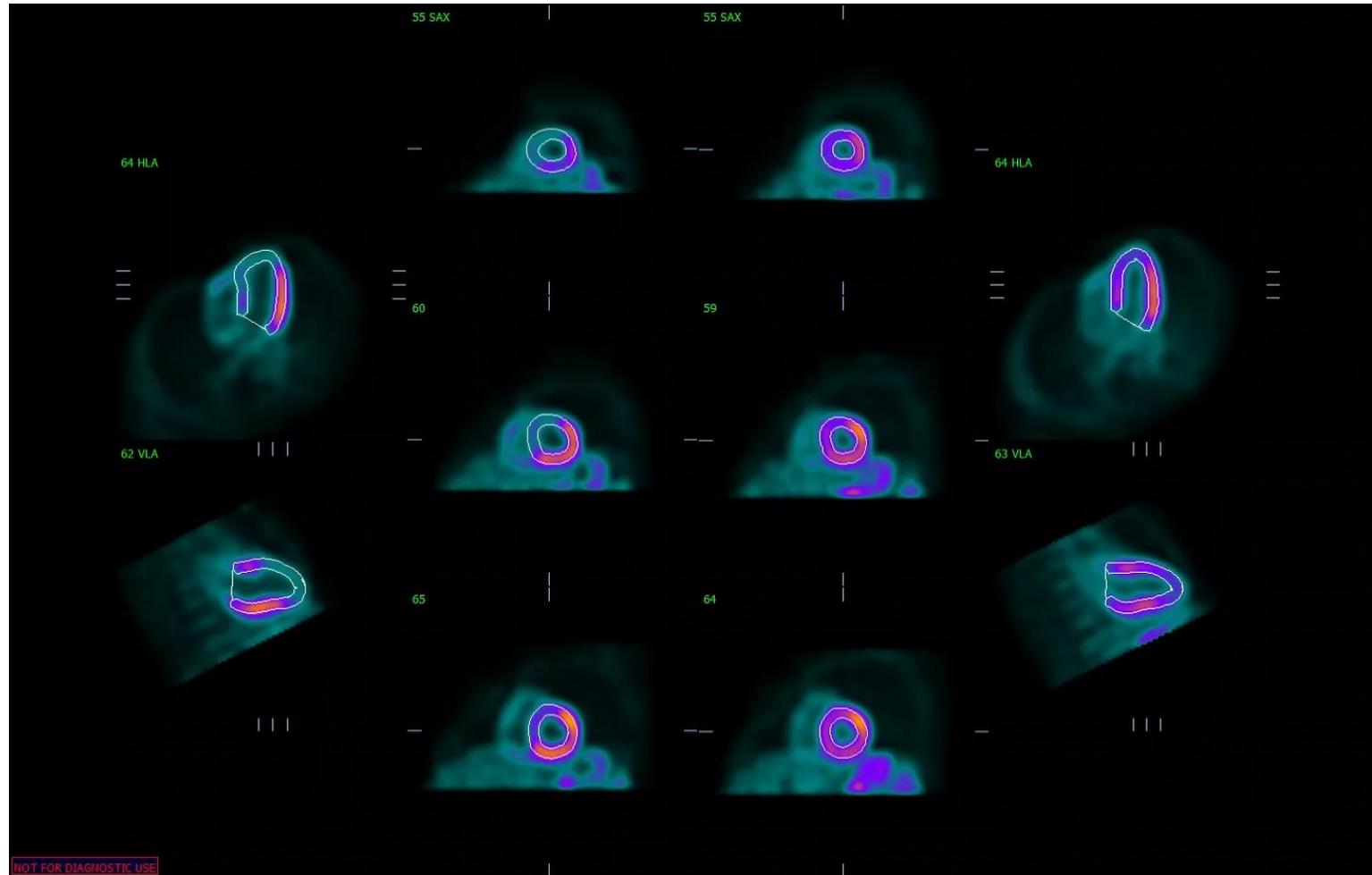
Gated Images



EF rest: 78%
EF stress: 68%



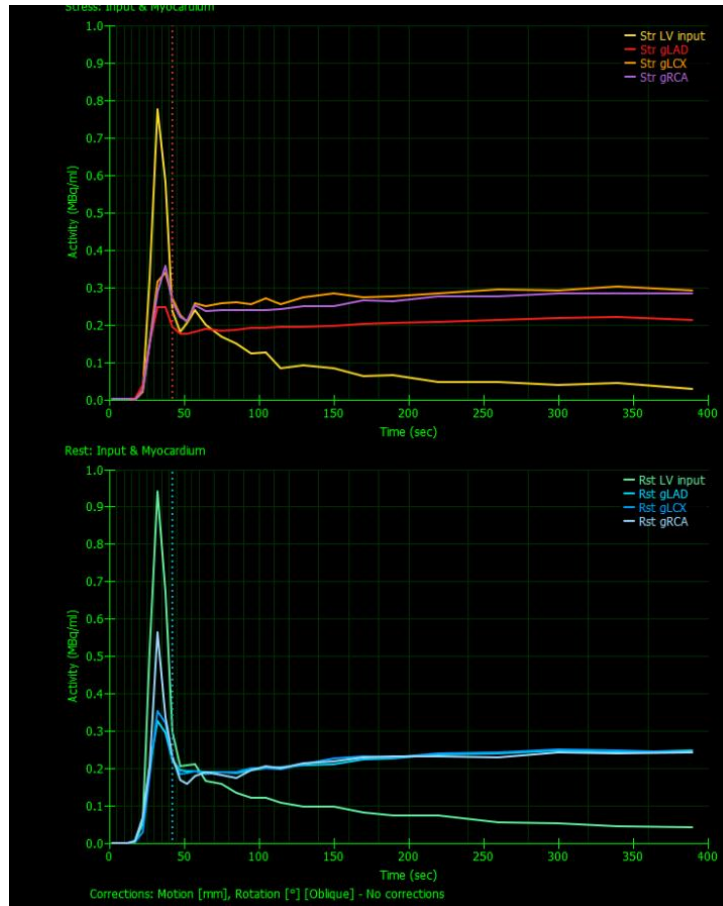
ECG-Gated Images



EF rest: 78%
EF stress: 68%



Myocardial Blood Flow: Cedars Software



MBFR Results

	Stress Flow	Rest Flow	Myo Flow Reserve	Stress Spillover	Rest Spillover
gLAD	1.69	0.87	1.86	0.33	0.34
gLCX	3.61	0.98	3.67	0.40	0.35
gRCA	2.83	0.86	3.35	0.38	0.44
TOT	2.15	0.88	2.39	0.35	0.37



PET Interpretation

- **Perfusion:** large anterior, antero/septal, apical defect from apex to base moderate to severe in intensity, completely reversible. TID ratio abnormal c/w ischemia (1.41)
- **Wall motion:** reversible anterior wall motion abnormality, with fall in EF from rest to stress (78 rest, 68 stress)
- **Myocardial blood flow:** normal global MBFR (2.39) but abnormal in LAD (1.86). These c/w single vessel ischemia
- Based upon these findings, cardiac catheterization was performed demonstrating 80% proximal LAD stenosis, normal LCX and RCA arteries
 - Successful Stent Placement in LAD



Cardiac Catheterization



Discussion

- This case demonstrates differences in accuracy between SPECT and PET Perfusion Imaging
- In this case, the SPECT study was normal but the PET study identified a significant stenosis in the LAD territory, and the patient underwent successful PCI with symptom relief
- Several meta-analysis demonstrate overall improvement in diagnostic accuracy of PET perfusion imaging (Bateman, Parker, McArdle). While it is well appreciated that specificity is better, the literature demonstrates a significantly higher sensitivity as well, demonstrated by this case



Teaching Points

- PET diagnostic accuracy is significantly higher than SPECT
- In cases of ongoing symptoms and normal SPECT, PET imaging may be useful
- Myocardial blood flow can assist in localizing diseased vessels as in this patient
- For higher risk patients, PET is the preferred modality in part due to better diagnostic accuracy



References

- Bateman ,TM. Al-Mallah MH Alnabelsi TS, Arumugam P, Calnon DA, Chareonthaitawee P, DeCarli M, Heller GV, Soman P Clinical indications for positron emission tomography myocardial perfusion imaging and myocardial blood flow quantification: An American Society of Nuclear Cardiology position statement. JNuclCard (2026) 57, 102619
- Parker 2014 Parker MW, Iskandar A, Limone B, Perugini A, Kim H, Jones C, Calamari B, Coleman CI, Heller GV. Diagnostic accuracy of cardiac positron emission tomography versus single photon emission computed tomography for coronary artery disease; A bivariate meta-analysis. Circ Cardiovascular Imaging 2012; 5: 700-707.
- McArdle, BA, Dowsley TF, deKemp RA, Wells, GA, Beanlands RS. Does Rubidium-82 have superior accuracy to SPECT perfusion imaging for the diagnosis of obstructive coronary disease? A systematic review and meta-analysis. J Am Coll Cardiol 2012; 60: 1828-37.



Key Words

- SPECT perfusion imaging
- PET perfusion imaging
- Diagnostic accuracy, PET

