Non-Invasive Identification of Patients with Left Main and Multivessel Coronary Artery Disease Using Positron Emission Tomography Myocardial Perfusion Imaging

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BACKGROUND

- Relative perfusion assessment underestimates the extent of epicardial coronary artery disease (CAD)
- Myocardial perfusion imaging (MPI) using Rb-82 PET quantifies several parameters that correlate more accurately with severity of CAD
- Mischaracterization of angiographic phenotypes may lead to inefficient use of resources post-MPI and potentially worse patient outcomes
- Proper identification of patient with left main or three-vessel disease (LM/3VD) may improve post-MPI use of angiography

AIM

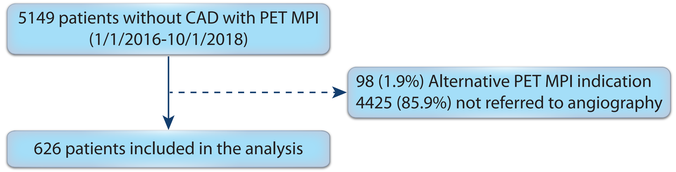
- Integrate multi-parametric input from PET MPI into a single prediction tool for LM/3VD at time of MPI

METHODS

- Consecutive patients with PET MPI and coronary angiography within 90 days (1/2016-10/2018)
- Patients with prior history of CAD were excluded
- LM/3VD was defined as ≥50% stenosis in the LM artery, ≥70% stenoses in proximal left anterior descending and left circumflex arteries or ≥70% involving all 3 major coronary arteries
- Independent predictors of LM/3VD were identified using multivariable logistic regression with bootstrap validation
- A integer score was assigned to each independent predictor according to weights of β-estimates in the regression model

RESULTS

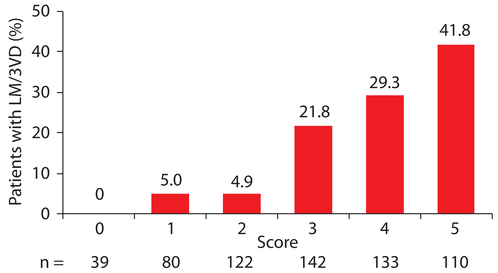
FIGURE 1



Variable	LM/3VD (n=126)	No LM/3VD (n=500)	P-value	Variable	LM/3VD (n=126)	No LM/3VD (n=500)	P-value
Age	72.2 ± 10.5	68.0 ± 11.6	< 0.001	Chrono Res.	16.6 ± 13.2	18.4 ± 13.8	0.193
Male	86 (68.3%)	275 (55.0%)	0.007	Peak SBP	117.1 ± 29.9	121.4 ± 27.6	0.551
Smoking	15 (11.9%)	69 (13.8%)	0.576	Peak DBP	58.3 ± 15.3	61.1 ± 14.3	0.436
Diabetes	62 (49.2%)	192 (38.4%)	0.027	BP Reserve	-16.1 ± 23.2	-10.1 ± 19.2	0.574
Hypertension	109 (86.5%)	393 (78.6%)	0.046	TID	1.1 ± 0.2	1.0 ± 0.3	0.002
CHF	17 (13.5%)	69 (13.8%)	0.928	%ischemia	19.3 ± 13.6	10.1 ± 9.8	< 0.001
PAD	12 (9.5%)	44 (8.8%)	0.799	CAC	1761 ± 1721	1018 ± 1454	< 0.001
Stroke	18 (14.3%)	35 (7.0%)	0.008	Global CFR	1.5 ± 0.5	1.8 ± 0.6	< 0.001
A Fib	25 (19.8%)	121 (24.2%)	0.301	LVEFr	-0.9 ± 12.4	2.2 ± 12.6	0.014

FIGURE 2

Variable		Points
Ischemia:	5-10%	1
	>10%	2
CFR:	<1.7	1
CAC:	100-1000	1
	>1000	2



RESULTS

- Study population included 626 patients (Fig. 1); LM/3VD was found in 126 (20.1%) patients
- Patients with LM/3VD were older with more comorbidities, greater ischemia and CAC but lower CFR and LVEFr (Table 1)
- Independent predictors of LM/3VD were ischemia, CAC and CFR
- "PET Diagnostic Score" integrates LM/3VD predictors; ranges from 0-5 (Table 2)
- Bias-corrected C-statistic for the model is 0.72
- A score ≤2 is associated with low likelihood of detecting LM/3VD (Fig. 2)

CONCLUSION

- Integrated anatomic and physiologic input from PET reliably identifies patients with LM/3VD at time of MPI
- The likelihood of finding LM/3VD angiographically when PET Diagnostic Score ≤2 is low (~5%)

IMPLICATIONS

- Validation of this prediction tool and evaluation of its impact on downstream rates of angiography in prospective cohorts is warranted
- If validated, angiography in patients with low Score (≤2) may be deferred with a trial of initial medical therapy

DISCLOSURES

- Dr. Al Badarin and Dr. Peri-Okonny are supported by National Heart, Lung, And Blood Institute of the NIH under Award Number T32HL110837. The NIH is not responsible for the content of this poster