

Mild cognitive impairment in middle-aged adults with coronary microvascular dysfunction

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Introduction: Coronary microvascular dysfunction (CMD) may be a manifestation of systemic small vessel disease, including the brain. The prevalence of cognitive impairment in CMD patients is poorly understood.

Purpose: To assess the prevalence of cognitive impairment in patients with CMD.

Methods: Between April 2018-March 2020, we enrolled patients with chest discomfort who were admitted to a chest pain observation unit and underwent 3D cardiac positron emission tomography/computed tomography (PET/CT). Exclusions included myocardial infarction, hypertensive urgency, and heart failure. Patients were categorized as 1) Normal: coronary flow reserve (CFR) ≥ 2.5 without perfusion defect or calcification, 2) Possible CMD: CFR 2–2.5 without perfusion defects or calcification, 3) CMD: CFR < 2 without perfusion defects or calcification and 4) coronary artery disease (CAD/CALC): any CFR with perfusion defects or calcifications. We assessed cognitive function with the Montreal Cognitive Assessment (MoCA) and used < 23 as the cutoff for impaired cognition. We added 1 point to the total score for those with 12 years of education or less. Odds ratios of cognitive impairment in each group were calculated with the normal group as reference, adjusting for age, sex, and race.

Results: Of 111 patients consented, 109 patients had complete data for analysis. (Table 1) Mean age was 57 years (± 11), 68% were female, and 49% were non-White. All 11 patients with CMD were females, with a mean age of 59 years (± 12). The majority (72%) of CMD patients had cognitive impairment on the MoCA compared to 25% of patients with normal flows (unadjusted OR: 8.00 [95% CI 1.70–37.67]), even after adjustment for age, sex, and race (OR: 37.23 (95% CI 2.01–677.05). MoCA scores did not differ significantly between the normal and the CAD/CALC group (unadjusted OR: 0.95 [95% CI 0.30–3.070]), or the possible CMD group (1.44 [95% CI 0.50–4.14]). Additionally, non-White patients were more likely to demonstrate cognitive impairment on MoCA than White patients (OR: 9.47 [95% CI 3.48–25.81]). There was no significant nonparametric correlation between CFR and the MoCA score ($r=0.05$, $p=0.6$).

Conclusion: Patients with CMD are more likely to have cognitive impairment, supporting the need to further investigate the heart-brain connection in systemic small vessel disease.

| Table 1 | Normal N=32 | Possible CMD N=37 | CMD N=11 | CAD/CALC N=29 |
|-------------------------------------|----------------|-------------------------|-------------|------------------|
| Characteristics | | | | |
| Age – mean (SD) | 55 (8) | 54 (11) | 59 (12) | 61 (11) |
| Female – n (%) | 23 (71.9) | 26 (70.3) | 11 (100.0) | 14 (48.3) |
| Race, non-White – n (%) | 17 (53.1) | 19 (51.4) | 6 (54.5) | 12 (41.4) |
| Education (12 years or less) | 6 (18.8) | 12 (31.6) | 5 (41.7) | 16 (55.1) |
| Past medical history – n (%) | | | | |
| Hypertension | 20 (62.5) | 26 (70.3) | 7 (63.6) | 24 (82.8) |
| Dyslipidemia | 24 (75.0) | 19 (51.4) | 9 (81.8) | 23 (79.3) |
| Hyperglycemia | 18 (56.2) | 16 (43.2) | 7 (63.6) | 10 (34.5) |
| Smoking | 14 (43.8) | 14 (37.8) | 6 (60.0) | 19 (65.5) |
| Measurements | | | | |
| Impaired MoCA n (%) | 8 (25.0) | 12 (32.4) | 8 (72.7) | 7 (24.1) |
| Median MoCA (IQR) | 25 (4.25) | 25 (7.00) | 22 (4.50) | 26 (5.00) |
| Median CFR (IQR) | 2.85 (0.55) | 2.30 (0.24) | 1.54 (0.53) | 2.53 (1.15) |

CAD/CALC: coronary artery disease/calcification; CMD: coronary microvascular dysfunction