

When the Brain Warns the Heart:

Frontal Hypoperfusion Predicts Atrial Fibrillation After Stroke

Gabriele Prandin MD, Giovanni Furlanis MD, Laura Mancinelli MD, Emanuele Vincis MD, Magda Quagliotto MD, Edoardo Ricci MD, Michele Malesani MD, Gianpiero Farina MD, Luigi Cattaruzza MD, Paola Caruso MD, Marcello Naccarato MD PhD, Paolo Manganotti MD PhD.

Clinical Unit of Neurology, Department of Medicine, Surgery and Health Sciences, ASUGI, University of Trieste, Trieste, Italy

Background and aims

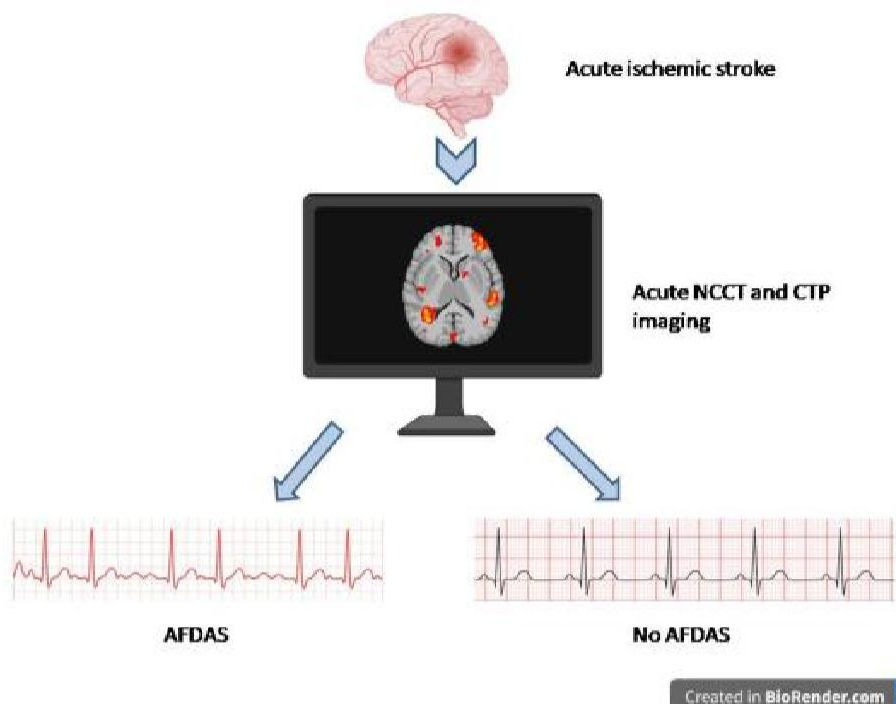
Post-stroke atrial fibrillation (AF) may be either newly emergent or previously undiagnosed, with potential cardiogenic or neurogenic origins. The ability to predict post-stroke AF through early imaging remains limited. This study investigates whether hyperacute CT perfusion imaging can identify patients at higher risk for post-stroke AF.

Materials and methods

We retrospectively analyzed data from 242 patients with acute ischemic stroke admitted to the University Hospital of Trieste between January 2019 and March 2020. Patients with known AF, hemorrhagic stroke, or TIA were excluded. Perfusion lesion volumes and locations were assessed. Post-stroke AF was defined as newly detected AF during hospitalization.

Results

Post-stroke AF was identified in a subset of patients characterized by older age, female sex, higher NT-proBNP levels, and worse functional outcomes. CT perfusion revealed a significant association between frontal-parietal-insular hypoperfusion and post-stroke AF. After multivariate adjustment, frontal lobe hypoperfusion remained independently associated with AF onset (OR 2.836, CI95% 1.406-5.719 p=0.004), whereas no significant associations were observed with final infarct volume or location on follow-up imaging. This result was confirmed in a sub analysis on embolic strokes (OR 2.286, CI95% 1.068-4.894, p=0.033).

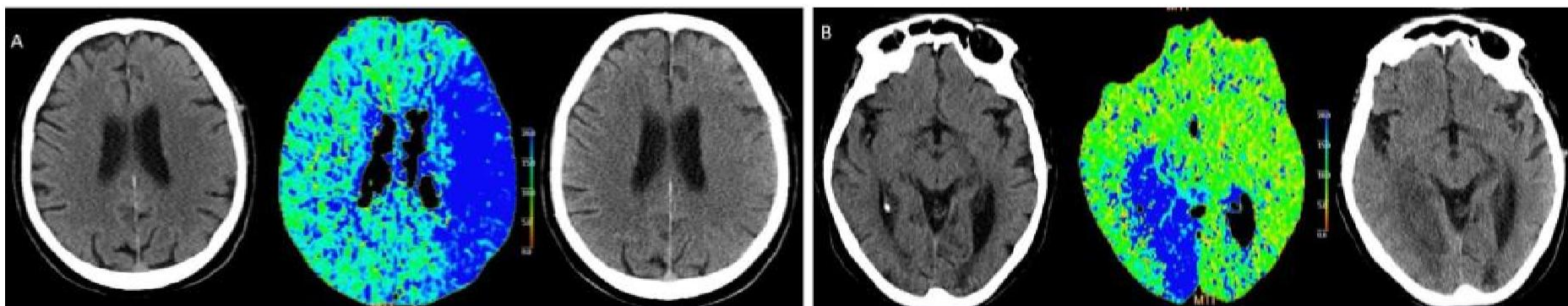


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	AFDAS §		
	OR	CI 95%	p value
CTP imaging			
Frontal hypoperfusion	2.836	1.406-5.719	0.004
Parietal hypoperfusion	1.536	0.744-3.171	0.245
Insular hypoperfusion	1.718	0.825-3.580	0.148
NCCT follow-up imaging			
Frontal infarction	1.786	0.918-3.476	0.088

§ all variables were adjusted for age, sex, smoke, history of chronic heart failure, NT-proBNP.

Representative Imaging Cases Illustrating AFDAS and frontal hypoperfusion (A) vs no AFDAS and temporal hypoperfusion (B)



Conclusions: Frontal hypoperfusion on hyperacute CT perfusion imaging may predict new-onset AF following stroke, suggesting a role of early autonomic dysregulation rather than infarcted tissue in AF pathogenesis. NT-proBNP was also a strong independent predictor. These findings support incorporating perfusion imaging and cardiac biomarkers into post-stroke AF risk stratification, though prospective multicenter studies are needed for validation.