Exploring the temporal relationship between atrial fibrillation and heart failure development. Analysis from a nationwide database

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Background: Atrial Fibrillation (AF) and Heart Failure (HF) often coexist and are closely intertwined, each condition worsening the other. Small cohorts studies have suggested a worse prognosis in patients who had developed HF first. However, the temporal relationships between these two pathologies have not been fully explored yet. We aimed to assess, at a nationwide scale, the prognosis of patients hospitalized with HF and AF, based on the timing of AF and HF development.

Methods: From the French administrative hospital-discharge PMSI database (Programme de Médicalisation des Systèmes d'Information), covering hospital care and representative of the whole french population. All consecutive patients with both diagnoses of AF and HF hospitalized between 2010 and 2018, whatever the order of occurrence for HF or AF, were included. From the database, 1,412,730 patients had inclusion criteria, of whom 403,934 developed AF First and 1,008,796 who developed HF First. Incidence rates (%/year) for the outcomes (all-cause death, cardiovascular (CV) death, or ischemic stroke) during follow-up were compared for each group using incidence rate ratios (RR) in the whole cohort and in a subgroup of 502,456 propensity-score matched patients (251,228 with AF first and 251,228 with HF first).

Results: In the whole population, most patients had developed HF before AF (n=1,008,796; 71.40%). At follow-up (median [IQR] 1.4 [0.1–3.7] years) patients with HF First had increased risk of all-cause death (yearly incidence: 18.9% vs 9.4%; [RR ([95% CI]): [2.01 (2.00–2.02)]; p<0.00001), and CV death (7.0% vs 3.0%; [RR 2.31 (2.29–2.34)]; p<0.00001). In propensity score matched population, (follow-up median [IQR] 2.2 [0.5–4.4] years), patients with HF first had also worse outcomes than patients with AF first (all-cause death rates yearly incidence; 15.2% vs 9.4% [RR 1.63 (1.61–1.64)], p<0.00001; CV death rates: 5.6% vs 3.0% [RR 1.87 (1.84–1.90)], p<0,00001; ischemic stroke rate: 2.2% vs 1.3% [RR 1.71 (1.67–1.76)], p<0.00001).

Conclusion: In our large study from a nationwide database in patients hospitalized with both AF and HF, two distinct clinical entities were identified, based on the chronological sequence of AF and HF developments. Our results confirming that HF preceding AF is much worse than the opposite, and this might have therapeutics implications. However, further studies are needed to investigate the underlying mechanisms of the interplay of these dual conditions.