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ANALYSIS OF RISK FACTORS AND ECHOCARDIOGRAPHIC MARKERS IN PATIENTS WITH HEART FAILURE AND ATRIAL FIBRILLATION

Introduction

In comparison to either illness alone, atrial fibrillation and heart failure often coexist, resulting in a complex clinical syndrome that is linked to a worse prognosis, higher hospitalisation rates, and increased death [1]. Studies show that about one-third of patients with HF also have concurrent AF, and that up to 40% of patients with AF will develop HF during the course of their condition [2]. Common risk factors for both illnesses include obesity, diabetes mellitus, valvular heart disease, hypertension, and coronary artery disease. These conditions promote structural and electrical remodelling of the myocardium, which predisposes to both atrial arrhythmogenesis and systolic/diastolic dysfunction.

Haemodynamic changes, such as higher left ventricular filling pressures, increased atrial strain, and neurohormonal activation, encourage electrical remodelling and fibrotic changes in the atrial myocardium in patients who already have heart failure [3]. Particularly in patients with compromised diastolic function, the absence of synchronised atrial contraction (atrial kick) lowers ventricular filling and may result in a 20–30% reduction in cardiac output.

Patients with poorly managed ventricular rates may develop tachycardia-induced cardiomyopathy, where prolonged tachycardia causes improper calcium handling, depletion of high-energy phosphates, and progressive ventricular failure [4]. With higher risks of stroke, systemic embolism, HF hospitalisation, and all-cause mortality, patients with both illnesses had worse results than those with either condition alone [5]. Recent studies indicate that early rhythm control may enhance results in certain populations, although the best timing and selection of therapies are still being investigated [6].

Goal

The main goal was to describe the clinical and demographic characteristics of patients who presented with atrial fibrillation as a heart failure complication, with a focus on the examination of the temporal relationship between HF diagnosis and AF onset, including latency periods and progression patterns.

Assessing echocardiographic markers, including as left atrial size, ventricular function, and valvular anomalies, that are linked to the development of AF in HF patients.

Determining the main risk factors and underlying causes that lead to the development of AF and the progression of HF.

Material and methods of research

A total of 36 patients with concurrent atrial fibrillation and heart failure were identified from discharge reports of patients admitted to Gomel City Clinical Hospital No. 3's Cardiology Department between October 1 and November 30, 2025, and were examined in this retrospective case study. Every patient in the analysis had a documented diagnosis of heart failure (stages H1, H2A, or H2B based on the local classification system) and atrial fibrillation (paroxysmal, persistent, or permanent). Detailed information, including discharge summaries, admission notes, consultation reports, and diagnostic study findings, was taken out of both paper-based and computerised medical records. To guarantee that pertinent characteristics were consistently recorded for every patient, a standardised data collecting form was used.

The results of the research and their discussion

A total of thirty-six patients were found to have both atrial fibrillation (AF) and heart failure (HF). The mean age of the group was 67.8 years (range: 47–87), with 21 patients (58.3%) being female. The age range of 60–69 had the highest incidence (38.9%), with the majority of patients (83.3%) being 60 years or older. The majority of patients (86.1%) lived in cities. Atherosclerotic cardiosclerosis (86.1%, n=31) and hypertension (94.4%, n=34) were the most common risk factors. 72.2% (n=26) had dyslipidaemia, with a mean total cholesterol of 5.3 mmol/L. Type 2 diabetes mellitus was found in 38.9% (n=14) and valve disease in 61.1% (n=22). Additional noteworthy comorbidities included confirmed obesity (27.8%) and chronic renal disease stage 3+(33.3%). 22.2% (n=8) of the group had a history of myocardial infarction, and AF developed in these patients 1–4 years after the infarction (Figure 1).

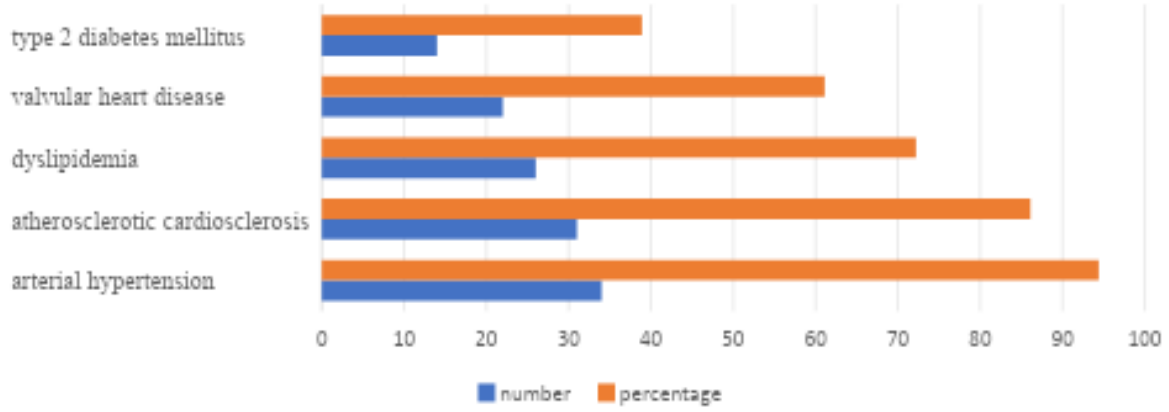


Figure 1 – Risk Factor Profile

36.1% (n=13) had heart failure with reduced ejection fraction (HFrEF), whereas the majority of patients (63.9%, n=23) had heart failure with preserved ejection fraction (HFpEF). Three different patterns emerged from the temporal connection analysis: HF before AF was the most prevalent pattern (63.9%, n=23), with an average delay of 3.1 years between the first episode of AF and the diagnosis of HF. A Concurrent diagnosis was observed in 27.8% (n=10) of patients, with both illnesses being identified during the same hospital stay. The least frequent pattern, seen in just 8.3% (n=3) of patients, is AF before HF. The most noticeable observation was left atrial (LA) enlargement, which was found in 83.3% (n=30) of the cohort (mean diameter 46.1 mm). 16.7%

(n=6) of the total, had normal left atrial diameter <40 mm, 33.3% (n=12) had mild enlargement with a diameter ranging from 40–45 mm. The patients who had moderate enlargement were 27.8% (n=10), with a diameter between 46 and 50 mm whilst 22.2% (n=8) had severe enlargement with a diameter >50 mm.

80.6% (n=29) had left ventricular hypertrophy, and 58.3% had pulmonary hypertension (estimated pressure >35 mmHg). The most common valve abnormalities (86.1%) were tricuspid regurgitation (69.4%) and mitral regurgitation (72.2%). Dyspnea was the predominant symptom (88.9%, n=32), followed by palpitations (77.8%) and fatigue (66.7%). Paroxysmal AF was the most common type (80.6%, n=29), while persistent and permanent AF accounted for 13.9% (n=5) and 5.5% (n=2) of cases, respectively (Figure 2).

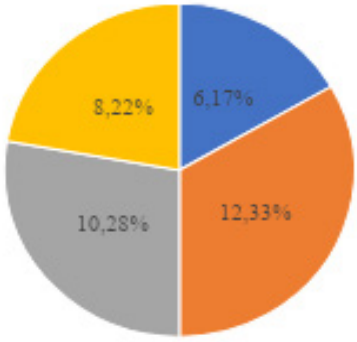


Figure 2 – ECG Findings Of Left Atrial Enlargement

Conclusions

With a mean age of 67.8 years and a female predominance of 58.3%, AF complicating HF primarily affects older persons. Hypertension, which affects 94.4% of patients with a mean length of 11.8 years, atherosclerotic cardiosclerosis, which affects 86.1% of patients with a mean duration of 7.5 years, and dyslipidemia, which affects 72.2% of patients with a mean duration of 8.2 years, dominates the risk factor profile. Of the group, 38.9% have type 2 diabetes, 33.3% have chronic renal disease stage 3 or higher, and 27.8% have obesity. The most common finding on echocardiography is left atrial enlargement, which is found in 83.3% of patients with a mean diameter of 46.1 mm and severe enlargement exceeding 50 mm in 22.2%. 80.6% have left ventricular hypertrophy and 58.3% have pulmonary hypertension. 86.1% of patients have valve abnormalities, with tricuspid regurgitation occurring in 69.4% and mitral regurgitation occurring in 72.2%. Compared to HFrEF, heart failure with maintained ejection fraction (63.9% of the sample) is more common and exhibits more severe left atrial enlargement, higher filling pressures, and greater pulmonary hypertension.

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