

Article

Atrial Fibrillation Complications in COVID-19-Infected Patients

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Abstract: Atrial fibrillation (AF) is the most prevalent chronic cardiac arrhythmia and frequently occurs with chronic heart failure (CHF) and make them a significant health and survival burden to elderly patients. The outbreak of the COVID-19 pandemic has made this already difficult clinical picture even more complex. The virus enhances cardiovascular dysfunction with effects which include increased inflammatory reactions, destruction of the endothelial cell lining, and a high probability of blood thrombosis. Despite the growing recognition of these intertwined processes, there remains a notable lack of detailed comparative data examining how complications manifest and evolve in patients suffering from both AF and CHF whether or not they have contracted COVID-19. This retrospective analytical investigation was performed at the Cardiology Department of Andijan State Medical Institute and included 285 patients aged 60–74 years diagnosed with AF and CHF. According to the status of COVID-19, there were 145 patients in the group of the infected, and 140 patients as controls. It was shown that the frequency of thromboembolic events in the infected cohort pulmonary embolism (12% vs. 5%), and ischemic stroke (15% vs. 8) were significantly high. Additionally, infectious complications most evidently bacterial pneumonia had much higher incidence in COVID-19-positive patients. These observations highlight the critical influence that the infection of SARS-CoV-2 has on the clinical course of people with both atrial fibrillation and chronic heart failure. Altogether, the information highlights the importance of personalized anticoagulation interventions, strict attention to hemodynamic monitoring, and attentive care to infection prevention. It is a critical point to have such an integrated approach to reduce adverse events and enhance long-term outcomes in such a vulnerable patient group.

Keywords: Atrial Fibrillation (AF), Supraventricular Tachyarrhythmias, Prevalence and Incidence Trends, Clinical Morbidity and Mortality, Elderly Demographics, Complex Cardiac Rhythm Disturbances, Population-Based Epidemiological Studies

1. Introduction

Cardiovascular diseases (CVDs) remain a leading cause of morbidity and mortality worldwide. Atrial fibrillation (AF) and chronic heart failure (CHF) frequently coexist and are associated with a significant decline in quality of life, increased hospitalizations, and high mortality rates. The cause and effect mechanism between AF and CHF is not straightforward since both diseases aggravate each other forming a negative loop of consequences [1].

The outbreak of the COVID-19 pandemic has created heightened vulnerability of cardiovascular disease patients to a significant degree. Studies continue to indicate that,

those who suffer cardiovascular diseases as well as those who suffer COVID-19 suffer a significant mortality rate that varies between 15 and 25 percent more than those who do not. On the same note, patients with heart failure experience 10 to 15 percent increased chances of death in case they contract the virus. The pathophysiological processes underlying this increased risk are complex; the COVID-19 provokes an inflammatory cascade and destabilizes endothelial integrity and promotes a prothrombotic condition. All these factors present a dangerous situation that favors both thromboembolic and bleeding-related complications and complicates the clinical management of this already vulnerable group of patients [2].

This study aimed to compare the prevalence and features of complications in patients with AF and CHF depending on whether or not they had COVID-19 infection [3].

Pertinence Complications are more likely to occur in patients with atrial fibrillation (AF) and chronic heart failure (CHF). BFI's relevance Because of their enormous prevalence, cardiovascular illnesses are very important in modern medicine. The prevalence of CVD and HF lowers patient quality of life and raises mortality, both of which have a detrimental effect on public health. These illnesses need sophisticated medical care and scientific methods since they are frequently linked. The development of these problems is made worse by COVID-19 infection. Finding variations in how the disease progresses and how it is treated will be made easier with the use of comparative analysis of complications between groups. According to studies, the death rate is 15–25% greater for patients with CVE during COVID-19 infection and 10–15% higher for those with HF [4].

Furthermore, patients are much more likely to require rehospitalization if these two diseases occur at the same time.

The study's objective: S The prevalence and features of problems in patients with UE and BF are compared according on whether or not they have a COVID-19 infection [5].

2. Materials and Methods

This study employed a retrospective analytical design and was carried out at the Cardiology Department of the Andijan State Medical Institute. This study included a total of 285 elderly patients, aged 60 to 74 years, all of whom had confirmed diagnoses of atrial fibrillation (AF) and chronic heart failure (CHF). Participants were stratified into two groups based on their COVID-19 infection status. Group 1 consisted of 145 individuals with laboratory-confirmed COVID-19 infection, while Group 2 comprised 140 patients with no documented history or clinical evidence of the disease [6].

The cases of AF and CHF have been made by performing a comprehensive clinical work-up, which includes physical examination, electrocardiographic examination, and echocardiographic confirmation. The diagnosis of COVID-19 infection was based on a positive polymerase chain reaction (PCR) test with its confirmation by clinical symptomology. The retrospective data gathering involved clinical and demographic data of patients in the form of patient medical records, such as laboratory findings and complication profiles. The complications that were considered included thromboembolic (pulmonary embolism and ischemic stroke), minor and major bleeding episodes, acute decompensation of heart failure, ventricular tachyarrhythmias, and infectious (especially bacterial pneumonia). Comparative statistical analyses that compared the occurrence of such complications in the two cohorts were performed and the results were evaluated in terms of percentages and 95 percent confidence intervals. Special attention was given to the clinical interplay between anticoagulation therapy, the prothrombotic state, and the inflammatory pathways activated by COVID-19. The study protocol received ethical approval from the institutional review board, and all procedures were carried out in accordance with established ethical and confidentiality standards for clinical research [7].

3. Results and Discussion

Andijan, Depending on whether they had a history of viral infections or not, the patients were split into two groups: CVE, BF, and COVID-19 were present in Group 1 (n=145), while CVE and BF were present but not infected with COVID-19 in Group 2 (n=140). The following were the study's methods: examination of medical history and data in hindsight. Evaluation of complications, including examination of bleeding, cardiac events, thromboembolic events, and infectious problems. The outcomes achieved [8].

The findings demonstrated that patients with COVID-19 had a noticeably increased frequency of thromboembolic events. Group 1 experienced a 12% pulmonary embolism (PE), while Group 2 experienced a 5% PE. Concurrently, 15% of patients in group 1 and 8% of patients in group 2 experienced a cerebral stroke [9].

Table 1. Comparative complications in AF + CHF patients with and without COVID-19.

Complication	Group 1: AF + CHF + COVID-19 (n = 145)	Group 2: AF + CHF, no COVID-19 (n = 140)
Pulmonary embolism	12% (18 pts)	5% (7 pts)
Cerebral stroke	15% (22 pts)	8% (11 pts)
Major bleeding	10% (15 pts)	4% (6 pts)
Minor bleeding	20% (29 pts)	12% (17 pts)
CHF decompensation	25% (36 pts)	15% (21 pts)
Ventricular tachyarrhythmia	18% (26 pts)	10% (14 pts)
Bacterial pneumonia	7.6% (11 pts)	1.4% (2 pts)

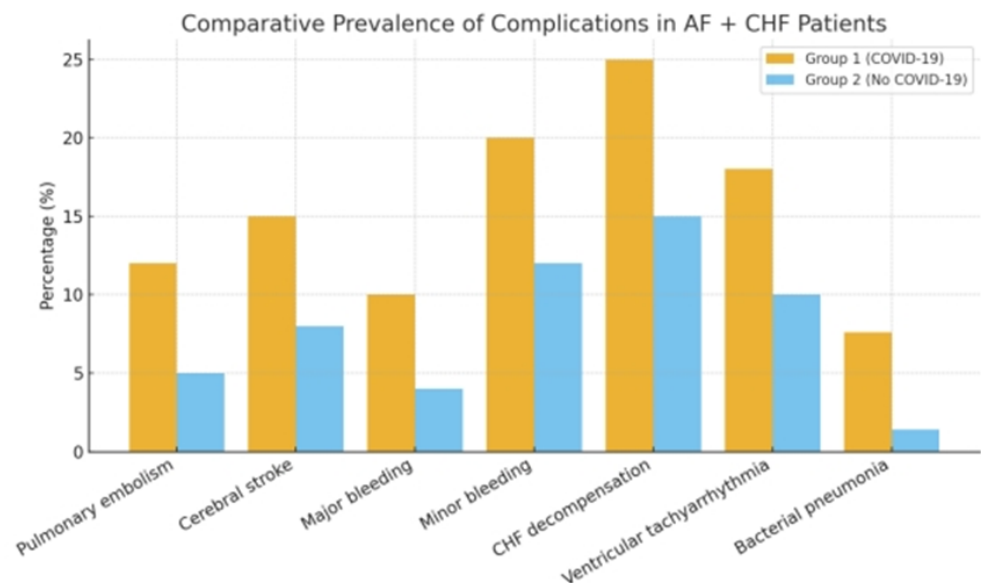


Figure 1. Comparative prevalence of complications.

According to the findings of the bleeding event analysis, people with COVID-19 are more likely to experience bleeding because to coagulopathy when taking anticoagulants. In our investigation, both significant and mild bleeding incidents were noted [10].

Ten percent of COVID-19 patients (group 1) and four percent of COVID-19-free patients (group 2) experienced major bleeding. Twenty percent of patients in group 1 and twelve percent of patients in group 2 experienced minor bleeding. These results indicate the need for careful dose selection and continuous monitoring of patients during anticoagulant therapy [11].

Acute decompensation of the UE occurred in 25% of instances in patients in group 1 and 15% in patients in group 2, indicating that cardiac problems were also reported in the individuals included in the study. The frequency of ventricular tachyarrhythmias also showed significant variations, with this indication being present in 18% of patients in group 1 and 10% in group 2. Bacterial pneumonia was 7.6% (<0.05) in patients in group 1 and 1.4% in patients in group 2, according to an analysis of infectious complications. In patient group 1, the reliable interval analysis was (0.067, 0.173). This suggests that the actual percentage, or frequency, of thromboembolic events in COVID-19 patients is probably in the range of 6.7% to 17.3%.

Patients in group 2 had a noticeably decreased incidence of VTE. The elevated incidence of thromboembolic events in COVID-19 patients is therefore explained by endothelial injury, inflammation, and hypercoagulation. The significant incidence of COVID-19-related bleeding suggests that anticoagulant dosages should be carefully chosen. In COVID-19 patients, inflammatory hypoxia increased the incidence of tachyarrhythmias and cardiac decompensation. Bacterial pneumonia was frequent due to the loss of immunity and the destruction of lung tissues that occurred as a result of the COVID-19 [12].

This paper evidences that the COVID-19 infection poses a significant threat of complications in patients with AF and CHF. Thromboembolic events were also high in patients with established COVID-19 infection. The observation is consistent with the current data that SARS-CoV-2 facilitates hypercoagulable state stimulation by the pathways that include endothelial dysfunction and the extensive inflammatory response activation [13].

The infected cohort also showed more bleeding complications. This is probably indicative to the complexities of anticoagulation management in the context of COVID-19 related coagulopathy wherein balancing between thrombotic risk and hemorrhagic complications is a major clinical issue. The cardiac complications such as acute heart failure decompensation episodes and ventricular arrhythmias were significantly more common in COVID-19 patients. These incidences seem to be precipitated by a mix of systemic hypoxia, an elevated inflammatory load, and a direct myocardial stress due to the viral infection [14].

As a result of viral lung injury and immune suppression, infectious complications, especially bacterial pneumonia, were much more common. These results are correlated with the reports of the world showing that COVID-19 is one of the key aggravating factors in cardiovascular patients. The management techniques should thus involve customized anticoagulation guidelines, close observation of the heart functioning and prevention of infections [15].

The study's findings demonstrate that in individuals with CVE and BF, COVID-19 infection dramatically raises the incidence and intensity of problems. Specifically, group 1 patients had a significant frequency of tachyarrhythmias, cardiac decompensation, hemorrhage, and thromboembolic events. Hypercoagulability and endothelial injury were identified as the primary reasons of the markedly increased incidence of STEMI and cerebral stroke in COVID-19 patients. Patients with COVID-19 who were taking anticoagulants had a higher incidence of both major and mild bleeding. This suggests that the dosage of anticoagulants needs to be carefully chosen. Patients with COVID-19 had a considerably greater incidence of tachyarrhythmias and chronic heart failure decompensation.

4. Conclusion

This study demonstrates that COVID-19 infection significantly exacerbates complications in patients with concurrent atrial fibrillation (AF) and chronic heart failure (CHF). Among 285 elderly participants, those infected with SARS-CoV-2 showed

markedly higher rates of thromboembolic events—pulmonary embolism (12% vs. 5%) and ischemic stroke (15% vs. 8%)—as well as increased major and minor bleeding episodes due to COVID-19–associated coagulopathy. Cardiac complications, including decompensated heart failure (25% vs. 15%) and ventricular tachyarrhythmias (18% vs. 10%), were also more frequent, indicating that systemic inflammation, endothelial damage, and hypoxia play major roles in worsening cardiac outcomes. Additionally, bacterial pneumonia was notably higher among infected patients (7.6% vs. 1.4%), reflecting weakened immunity and pulmonary injury. These findings confirm that COVID-19 amplifies cardiovascular and infectious risks in individuals with AF and CHF. Therefore, careful anticoagulant management, continuous hemodynamic monitoring, and strict infection prevention strategies are essential to minimize complications and improve prognosis in this vulnerable population.

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