

# Impact of the coronavirus disease 2019 pandemic on atrial fibrillation and atrial flutter ablation rates. The analysis of nearly 5 million Polish population

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## INTRODUCTION

The pandemic of coronavirus disease 2019 (COVID-19), which is caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has contributed to significant changes in the organization of public healthcare. Since hospitals had to be prepared for an increased number of infected patients, most elective procedures were postponed. A reduction in hospital admissions for acute coronary syndromes in association with a decreased number of cardiac catheterizations was observed in Poland [1]. These limitations, which were introduced to avoid unexpected outbreaks in hospitals, potentially also affected patients with atrial flutter (AFL) or atrial fibrillation (AF). According to expert recommendations, the exception should be applied to therapeutic procedures, including ablation in the cases of hemodynamically significant, severely symptomatic, drug and/or cardioversion refractory AF or AFL or in the case of pre-excited AF with syncope or cardiac arrest [2]. The detailed instruction of the arrangement of electrophysiology procedures was published by the Heart Rhythm Section of the Polish Cardiac Society at the very beginning of the pandemic [3]. In the current analysis, the aim is to demonstrate the impact of the COVID-19 pandemic on the number of AFL and AF ablations and clinical characteristics of patients who underwent ablation in the Silesian Province during the lockdown imposed in Poland in 2020.

## METHODS

The analysis was based on the data from the Silesian Cardiovascular Database (SILCARD), which collected information on all patients hospitalized for cardiovascular diseases in the Silesian Province, which is the most urbanized region in Poland inhabited by 4.57 million people, constituting approximately 12% of the total population of Poland. All data for the registry have been provided by the National Health Fund (NHF) since 2006. Detailed information on the SILCARD registry was previously reported [4]. The SILCARD registry was approved by the local Ethics Committee. Only patients below 18 years of age at the time of admission or those who lived outside the Silesian Province were excluded from the registry. The collected data included information on initial hospitalization with a diagnosis of cardiovascular disease (CVD) with a potential transfer to another department or hospital, other hospitalizations, and data from outpatient visits. If the patient was hospitalized again due to CVD within 24 hours, both hospitalizations were considered one admission. According to the applicable rules, hospitals are obliged to report to the NHF on the principal diagnosis with up to two comorbidities as defined by the International Classification of Disease, 10<sup>th</sup> revision (ICD-10), and medical procedures defined by the ICD-9 classification. CVD was defined as R52, J96, or any "I" code based on the ICD-10. The hospital registry number and national identifi-

cation number (PESEL) were used to match the information to each patient. All data were anonymized.

For the purposes of the study, patients with diagnosed AF or AFI (ICD-10 code I48) who underwent ablation procedures (ICD-9 codes for ablation: 37.341, 37.342, for 3D mapping: 37.272 and for electrophysiological studies: 37.26) between weeks 12 and 22 of 2019 and weeks 12 and 22 of 2020 were selected for the analysis from the SILCARD registry. Baseline characteristics of the included patients and the number of ablation procedures were analyzed and compared between the time periods. Additional exclusion criterion comprised a simple ablation procedure (e.g., AV-node ablation) or electrophysiological studies without ablation defined by the following codes by the NHF, i.e., 5.06.00.0000969, 5.51.01.0005044, and 5.06.00.0000970.

### Statistical analysis

Statistical analysis was performed using STATISTICA PL version 13.3 (TIBCO, Palo Alto, USA). The normality of distribution was verified using the Shapiro-Wilk test. Continuous variables were summarized using median with interquartile range for non-normal distribution and were compared using the Mann-Whitney U test. Categorical variables were summarized using frequency tables. For the comparison of categorical data, the chi-square test was used. The results were considered statistically significant for two-sided  $P < 0.05$ .

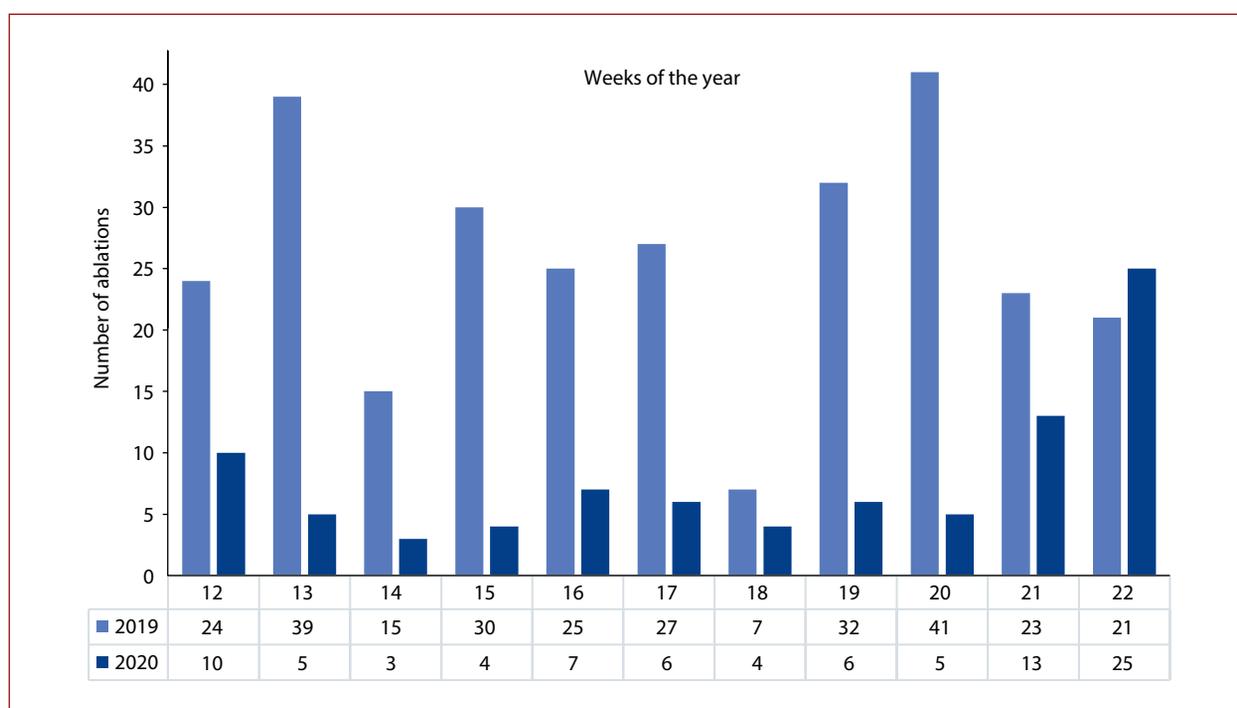
## RESULTS AND DISCUSSION

The COVID-19 pandemic had a significant impact on the treatment of patients, including AF and AFI therapy. During

the lockdown imposed in Poland from 12<sup>th</sup> March to 31<sup>st</sup> May 2020, the number of patients hospitalized for elective cardiac procedures and heart surgery, including the treatment of the above arrhythmias, decreased significantly compared to the same period in 2019 [5, 6]. The previously observed upward trend in the number of ablation procedures in the Silesian Province [7] was also disturbed by the pandemic. We found a decreased number of percutaneous ablation procedures compared to 2019 (Figure 1).

The impact of the COVID-19 pandemic on the number of electrophysiological procedures varied across countries and regions, depending on the availability of hospital beds or necessary changes in healthcare management. Li et al. [8] found a significant decrease in the number of electrophysiological procedures performed in various countries, which was related to the time of occurrence of the first wave of the disease. Based on Italian data, Boriani et al. [9] indicated diverse numbers of procedures performed in different regions of the country, depending on the number of patients infected with the SARS-CoV-2. Contrary to other observations, a decrease in the number of ablation procedures was not documented in Shanghai, which is a municipality under the direct administration of the central Chinese government, after the implementation of an efficient pandemic management system [10]. Furthermore, in that analysis, the performed procedures were not related to the increased number of COVID-19 infections in the medical personnel.

Based on the previously published data, a large reduction in elective procedures could be noticed. However, urgent procedures such as electrical storm ablation or treat-



**Figure 1.** The number of atrial fibrillation and atrial flutter ablations in the compared periods of 2019 and 2020

ment of arrhythmias, including AF, causing hemodynamic instability, were treated with adequate prophylaxis without undue delay, regardless of the result of the SARS-CoV-2 test [8, 10]. Additionally, patients eligible for ablation were older, mostly male, and presented with comorbidities (such as diabetes, hypertension, or heart failure), which increased the risk for an unfavorable course of infection [8, 10]. These data are consistent with our observations. We found that patients with a higher percentage of comorbidities such as heart failure ( $P = 0.03$ ), diabetes ( $P < 0.001$ ), or coronary heart disease ( $P < 0.001$ ) were more often enrolled for ablation during the pandemic time. Interestingly, in the past, most patients had already undergone cardioversion ( $P < 0.01$ ) or ablation, regardless of the prior invasive treatment ( $P < 0.001$ ) (Supplementary material, Table S1). This treatment strategy was in line with the current recommendations of cardiology societies [2, 11, 12].

### Limitations

This study has some limitations. The data used for the analysis were based on the electronic database of a single healthcare provider and consisted of core variables, such as demographic characteristics, comorbidities, and in-hospital events. Furthermore, the classification often does not specify the subcodes of individual diseases and comorbidities. Therefore, the available data may be imprecise. Based on the electronic database, it was impossible to distinguish cavotricuspid ablation for AFL from pulmonary vein isolation for AF due to the fact that the same codes (ICD-10 and ICD-9) are applied to both procedures.

### CONCLUSIONS

Imposing the lockdown due to the COVID-19 pandemic provoked a reduction in the number of AFL and AF ablations in the Silesian Province. During the lockdown period, invasively treated patients presented with a greater number of comorbidities compared to the pre-COVID-19 era.

### Supplementary material

Supplementary material is available at [https://journals.viamedica.pl/kardiologia\\_polska](https://journals.viamedica.pl/kardiologia_polska).

### Article information

Data were collected as part of the Silesian Cardiovascular Database (SILCARD) — ClinicalTrials.gov identifier, NCT02743533. <https://clinicaltrials.gov/ct2/show/NCT02743533>

**Conflict of interest:** None declared.

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