Relative blood pressure increase is associated with subsequent atrial fibrillation episodes in long-term out-patient monitoring: TriggersAF

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Background: The role of chronic blood pressure (BP) increase in atrial fibrillation (AF) pathogenesis is usually limited to risk factor assessment. Dynamic real-time BP fluctuations before arrhythmia initiation remain poorly understood. This study aims to investigate the chronological changes of BP before AF.

Methods: In this single-center prospective cohort study subjects with diagnosed paroxysmal or persistent AF underwent a 7-day outpatient telemonitoring. All patients were in sinus rhythm at the moment of inclusion. During the monitoring period, a continuous single-lead electrocardiogram (ECG) was registered. The recorded data was manually classified into four cardiac rhythm categories: atrial fibrillation, atrial tachycardia or flutter, frequent premature atrial contractions, and no arrhythmia. In addition, arterial blood pressure (BP) measurements were obtained periodically for the first 2 days at intervals of 15 minutes during the day, every 30 minutes during the night, followed by conventional BP measurements for the remaining observation period. BP data was synchronised with the ECG recordings. Systolic (SBP) and diastolic (DBP) values within 60 minutes before AF (investigational group) were compared to the control BP of the same patients measured in at least 2 consecutive hours with no AF detected. The analysis segregates day and night. Since AF tended to group into a series of episodes, a filter of a minimal duration without AF before the start of the episode was applied (5, 10, 20 or 30 minutes), aiming to select the initializing episode of the AF and avoid duplicate BP measurements.

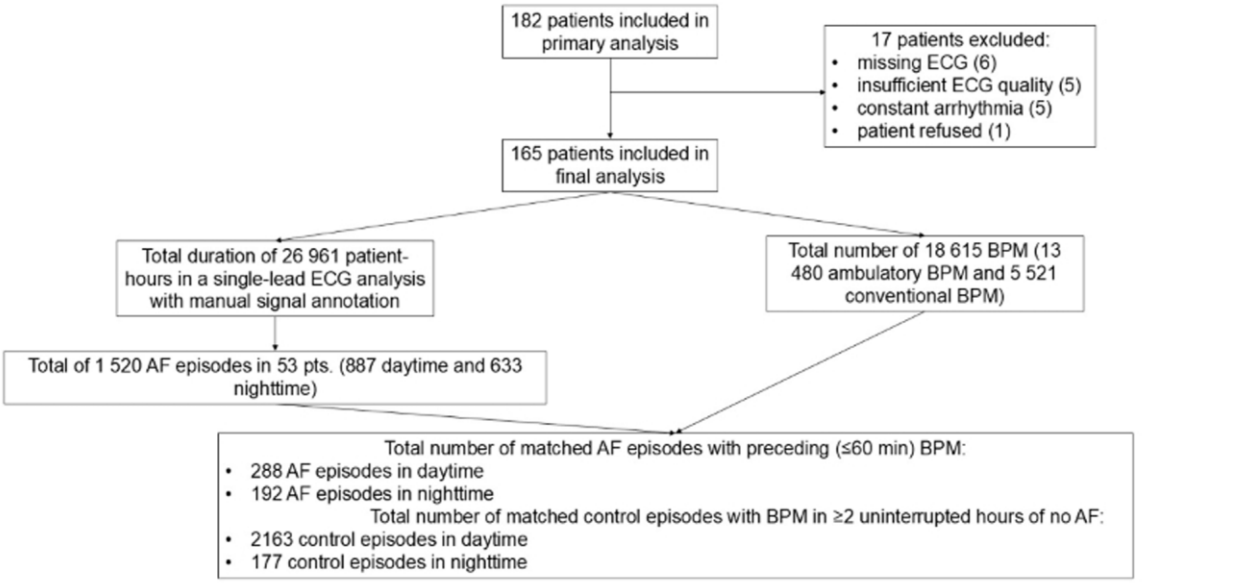
Results: The enrolment lasted from 2020 to 2023, resulting in 165 subjects, aged 59.0±11.8 years, 61.8% male. Physicians manually annotated a total duration of 26961 hours in a single-lead ECG analysis. Among detected atrial arrhythmia episodes 1520 were AF in 54 patients (Figure 1).

The individual relative change of BP yielded an increase of SBP before daytime and nighttime AF and an increase of DBP before nighttime AF irrespective of the filter used (Figure 2). When no filter was applied the BP before AF vs. control was as follows, respectively: 1) Daytime SBP change +2% (±9) vs. 0% (±11), $p<0.001$ and nighttime +11% (±10) vs. 0% (±12), $p<0.001$; 2) Daytime DBP change 0% (±10) vs. 0% (±12), $p=0.5$ and nighttime +14% (±20) vs. 0% (±16), $p<0.001$.

The absolute BP values did not differ between AF vs. control groups irrespective of the filter used. With 5-min filter: 1) Daytime SBP 125 (±13) vs. 127 (±17), $p=0.5$ and nighttime 118 (±15) vs. 117 (±18), $p=0.5$; 2) Daytime DBP 80 (±12) vs. 81 (±13), $p=0.5$ and at nighttime 68 (±15) vs. 68 (±15), $p=0.8$.

Conclusions: This is the first study to assess the chronological changes of BP before AF. Within 60 minutes before AF episodes the relative individual daytime and nighttime systolic BP and the relative individual nighttime diastolic BP increase. This, however, does not transfer to a difference in absolute BP values.

Flowchart



AF – atrial fibrillation; BPM – blood pressure measurements; ECG – electrocardiogram

BP change vs. AF with 5-min filter