Impact of photoplethysmography on therapeutic decisions in atrial fibrillation

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79 (10): 1155–1156; DOI: 10.33963/KP.a2021.0076

Received: May 20, 2021

Revision accepted: July 23, 2021

Published online: July 27, 2021 In the era of the SARS-CoV-2 pandemic, the global health crisis required limiting faceto-face patient consultations. This situation demanded rapid identification and implementation of remote healthcare delivery methods.

A 42-year-old man with a 4-year history of paroxysmal palpitations (European Heart Rhythm Association IIb) and a documented first episode of atrial fibrillation (AF) a year before was admitted to the department for catheter ablation. He had a history of stable ischemic heart disease, hypertension, and hyperlipidemia. The pulmonary vein isolation procedure was performed with a CARTO 3D mapping system and NaviStar Smart SF catheter (Biosense Webster, Irvine, CA, USA). The left atrium and pulmonary veins were mapped with PentaRay multielectrode catheter (Biosense Webster) and merged with 3D reconstruction from rotational angiography. At the end of the procedure, sinus rhythm was documented, and the patient was discharged from the hospital in good condition without any periprocedural complications. Three months after the discharge, and therefore after the blanking period, the patient was included in a novel pan-European project TeleCheck-AF, designed to facilitate remote management of patients with AF [1, 2]. Participation consisted of measuring heart rate, rhythm, and symptoms using the Fibri-Check mobile app on-demand at scheduled time points after AF ablation procedures. The FibriCheck app uses a photoplethysmography (PPG) technique through the camera built into a smartphone. Measurements are made by placing a finger over the camera for 1 minute.

Our patient was instructed to perform rate and rhythm measurements 3 times a day

and in case of symptoms for one week. The PPG recordings were instantly transferred to a secured cloud, which was then evaluated by an attending physician and further discussed with the patient during a teleconsultation [3]. The PPG recordings indicated a recurrence of AF, and nearly half of the measurements were accompanied by palpitations (Figure 1), which was confirmed during a physical examination. Due to these measurements, the patient was scheduled for another re-do catheter ablation procedure qualification. The patient had standard electrocardiogram, ECHO, and Holter electrocardiogram before making a decision. The re-do procedure included the left atrial roof and cavotricuspid isthmus ablation. There were no periprocedural complications.

Many mobile apps and wearable devices used to control cardiac arrhythmias are currently available. Many studies have shown high sensitivity and specificity of PPG-based apps ranging between 91.5%-98.5% and 91.4%-100% compared to an electrocardiogram. Despite these optimistic values, they should be treated with caution because of the small populations studied and a possible bias due to signal selection [4]. The Fibricheck was established to have a sensitivity of 95.6% and a specificity of 96.6% in a diagnostic accuracy study [5]. Regular monitoring of heart rhythm increases the chances of detecting a recurrence of AF after an AF ablation procedure; it supports an informed treatment decision and ultimately reduces symptoms in our patients.

This case highlights the feasibility of PPG applications in monitoring patients after ablation and shows how the results can be used to guide further therapeutic decisions. Further

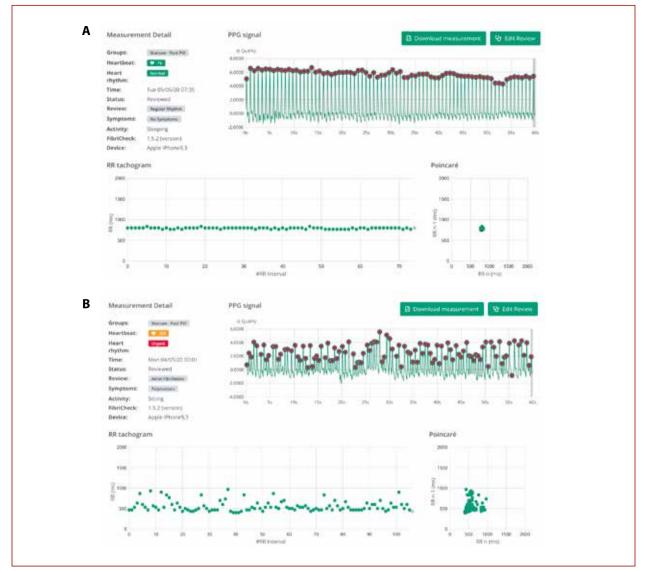


Figure 1. Photoplethysmography signal during A. normal sinus rhythm and B. during atrial fibrillation with concomitant palpitations

study is warranted to investigate if the PPG technology can be used as routine rhythm monitoring for the follow-up after AF ablation.

Article information

Conflict of interest: None declared.

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How to cite: Starczyński M, Krzowski B, Gawałko M, et al. Impact of photoplethysmography on therapeutic decisions in atrial fibrillation. Kardiol Pol. 2021; 79(10): 1155–1156, doi: 10.33963/KP.a2021.0076.

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