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COMMENT

Irregular heart rhythm algorithm: a novel strategy to accurately detect atrial fibrillation by ambulatory monitoring of blood pressure

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Atrial fibrillation (AF) is the most common arrhythmia encountered in clinical practice. It is associated with the risk of developing some adverse cardiovascular events, including cerebral embolism and heart failure [1]. The development of AF depends on a variety of risk factors, including age, sex, race, hypertension, heart failure, coronary artery disease, valvular heart disease, obesity, diabetes, and chronic kidney disease [2]. Among these risk factors, hypertension has been established to be the most important factor [3, 4] In addition, in patients with AF, hypertension is one of the risk factors for the development of cerebral embolism [5]. In this regard, the Japanese guideline on pharmacotherapy of cardiac arrhythmias recommends the use of the $CHADS_2$ score for the risk assessment of thromboembolism in patients with AF, in which "H" indicates hypertension [6]. An early diagnosis and the subsequent initiation of appropriate treatment for AF, including anticoagulation therapy, is strongly required in hypertensive patients. However, the diagnosis of AF is not easy in the clinical setting. Almost 40% of AF patients are asymptomatic [7]. Most of these patients are diagnosed as having AF at annual health check-up examinations [7]. The type of AF that is diagnosed at health check-up examinations is mostly the persistent type. Paroxysmal and asymptomatic AF is difficult to diagnose because there are few chances to detect AF by standard 12-lead electrocardiogram (ECG) [8]. Some of these patients unfortunately develop cerebral embolism before the diagnosis of AF. Although detailed assessment with 24-h Holter ECG is needed to detect AF, the chance of detection is limited [9]. On the other hand, ambulatory blood pressure monitoring (ABPM) is currently considered the most accurate method for diagnosing hypertension [10, 11]. Several institutions have recommended that most or all subjects with suspected hypertension undergo ABPM [12]. Notably, an ABPM device that especially implements an algorithm to automatically detect AF during each blood pressure measurement has been developed in recent years. In fact, Kollias et al. [13] demonstrated the high diagnostic accuracy of detecting AF using 24-h ABPM devices with AF detection algorithms.

In this issue of *Hypertension Research*, Watanabe et al. [14] reported that a 24-h ABPM device with a new irregular heartbeat (IHB) algorithm may be useful for the comprehensive management of hypertensive patients, including the early detection of AF. Among the 3347 valid reading cases, 843 cases (25%) were considered to indicate IHBs. Among these IHB reading cases, 195 cases (23%) were found to have an AF rhythm by 24-hour Holter ECG. In their comparison of 7 patients in the paroxysmal AF group and 47 patients in the normal group at the time of evaluation by 24-h Holter ECG, the authors observed that the patients with paroxysmal AF had a higher IHB burden and higher maximum number of consecutive IHBs than the patients in the normal group (IHB burden 29.3 ± 15.7% vs. 12.8 ± 10.3%, $p = 0.001$ and maximum number of consecutive IHBs 3.7 ± 2.3 vs. 1.6 ± 1.1, $p = 0.050$, respectively). Furthermore, the two optimal IHB parameters for suggesting potential AF were (1) an IHB burden defined as a percentage of IHB-positive measurements in total valid BP measurements >22.5% (84.6% sensitivity, 85.1% specificity) and (2) 2.5 or more consecutive IHBs shown in 24-h ABPM (84.6% sensitivity, 83.0% specificity). Based on these findings, the authors [14] concluded that the risk stratification for AF development using a 24-hour ABPM device with a new IHB algorithm may contribute to the comprehensive management of hypertensive patients with the main goal of preventing cerebrovascular events.

Again, hypertensive patients are prone to AF. Once AF develops, these patients are at high risk for cardiovascular events, including cerebral embolism. Figure 1 shows the graphical summary of the study by Watanabe et al. [14].

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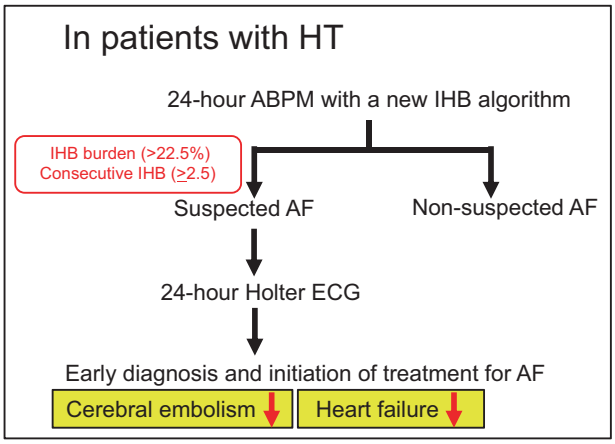

Fig. 1 Usefulness of 24-h ambulatory blood pressure monitoring with a new irregular heartbeat algorithm in patients with hypertension. ABPM ambulatory blood pressure monitoring; AF atrial fibrillation; ECG electrocardiogram; HT hypertension; IHB irregular heartbeat

As shown, the proposed criteria, i.e., a high IHB burden >22.5% and 2.5 or more consecutive IHBs, resulted in surprisingly high sensitivity and specificity (both >80%) to detect AF. The 24-h ABPM is covered by insurance for patients with hypertension. Hopefully, a more sophisticated algorithm will be developed. The widespread use of the 24-h ABPM device with an excellent IHB algorithm would increase the chance of the early detection and diagnosis of AF, which can reduce the number of patients who unfortunately develop cerebral embolism before the diagnosis of AF.

Compliance with ethical standards

Conflict of interests The authors declare no competing interests.

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