Abstract: **P6539**

Automated detection of atrial fibrillationb based on vocal features analysis

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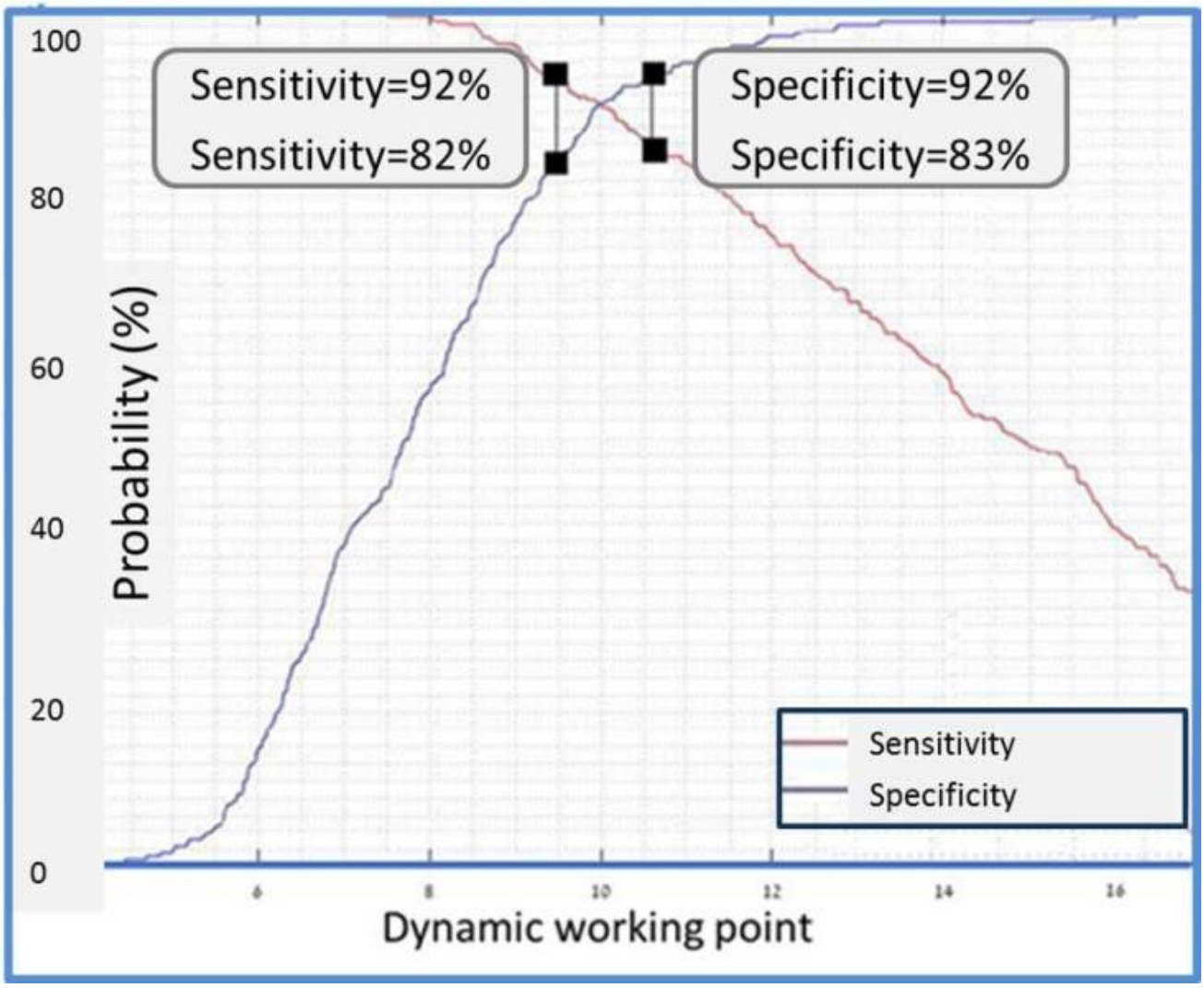
Background: Early identification of atrial fibrillation (AF) has been a long-standing clinical challenge and an unmet need. AF may be present without the patient being aware of any symptoms, leading to a delay in or failure of diagnosis. ESC guidelines recommend opportunistically screening patients >65 years of age using pulse palpation or an ECG rhythm strip, however these methods have limited effectivity. Analysis of natural speech signals has been used as a monitoring tool for various medical conditions and has recently been reported to enable estimation of heart rate. In this study we evaluated the efficacy of vocal features analysis in the detection of AF and in discriminating between sinus rhythm (SR) and episodes of AF.

Methods: In this prospective multicenter study, patients with persistent AF admitted for cardioversion were enrolled. A total of 86 patients in 2 centers were included. Prior to cardioversion, the patients spoke specific vowels and words according to a pre-specified protocol; an ECG tracing was simultaneously recorded. Following successful cardioversion and recovery from sedation, these recordings were repeated in SR. The recordings of the first 34 patients were used to develop an algorithm of AF detection based on analysis of acoustic features in SR and AF conditions. The algorithm was then validated in all of the patients (n=86) in the following manner: 25% of SR recordings were used to train the algorithm while the remaining 75% of SR and 100% of AF data from every patient were tested with the algorithm to distinguish between AF and SR.

Results: A total of 513 recordings from 86 patients were analyzed. Classification of the recordings as AF or SR was performed using varying cutoff values of the separation parameter. The resulting curve showing the specificity and sensitivity of the developed algorithm for distinguishing AF from SR is presented. Two specific examples of working points are a specificity of 92% and sensitivity of 83%, and a specificity of 82% and sensitivity of 92%.

Conclusions: This study demonstrates the feasibility of detecting AF and discriminating it from SR using analysis of acoustic features extracted from spoken vowels. The potential use of this method for wider population screening should be further evaluated.


Sensitivity=92%
Sensitivity=82%
Specificity=92%
Specificity=83%
100
80
60
40
20
0
Probability (%)
Sensitivity
Specificity
6
8
10
12
14
16
Dynamic working point

Automatic Atrial Fibrillation Detection Using Voice Analysis Algorythm

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Background: An early identification of atrial fibrillation (AF) has been a long-standing clinical challenge. The ESC guidelines recommend screening patients > 65 years of age using pulse palpation or an ECG rhythm strip. These methods have limited effectivity. Analysis of natural speech signals has been used as a monitoring tool for various medical conditions. Recently it has been reported to enable estimation of heart rate.

Aim: In this study we evaluated the efficacy of vocal features analysis in the detection of AF and in discriminating between sinus rhythm (SR) and episodes of AF.

Methods: Prospective multicenter (2 centers) study has been conducted. Consecutive 86 patients with persistent AF admitted for cardioversion were enrolled. Prior to cardioversion, the patients voiced specific vowels and words according to a pre-specified protocol. An ECG tracing was simultaneously recorded. These recordings were repeated in SR following cardioversion. The recordings of the first 34 patients were used to develop an algorithm of AF detection based on analysis of acoustic features in SR and AF. The algorithm was then validated in all 86 patients: 25% of SR recordings were used to train the algorithm and the remaining 75% of SR and 100% of AF data from every patient were tested with the algorithm to distinguish between AF and SR.

Results: The total of 513 recordings were analyzed. Classification of the recordings as AF or SR was performed using varying cutoff values of the separation parameter. The resulting curve showing the specificity and sensitivity of the developed algorithm for distinguishing AF rom SR is presented in Figure .

Conclusion: This study demonstrates the feasibility of detecting AF and discriminating it from SR using analysis of acoustic features extracted from spoken vowels. The potential use of this method for wider population screening will be further evaluated.

Two specific examples of working points demonstrate values of 92% specificity with 83% sensitivity, and 82% specificity with 92% sensitivity.