

Validation of Adhesive single-lead patch ECG monitoring device compared with intracardiac electrogram during ablation procedure in patients with atrial fibrillation

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Background

Continuous electrocardiography monitoring using adhesive single-lead patch electrocardiography (ECG) monitoring may be useful for early diagnosis of the atrial fibrillation (AF). In the current study we tried to validate the AF-diagnosis algorithm of patch ECG by comparison with the intracardiac electrogram during ablation procedure.

Methods

Patients with paroxysmal AF who underwent radiofrequency ablation (n=9) or cryoballoon ablation (n=9) were prospectively enrolled. The single-lead electrocardiography recorded using adhesive patch monitoring (ATpatch, ATsens, Seoul, Korea) simultaneously with the intracardiac electrogram during the ablation procedure. Two electrophysiologists independently analyzed and labelled the patch ECG. The machine learning (ML) algorithm of the patch monitoring was validated using the intracardiac electrocardiogram.

Results

A total of 18 patients were enrolled in the current study (median 57 years old, 66.7% male). Patch ECG generated a total of 5,985 30-second ECG samples (2,474 for SR, 2,223 for AF, and 1,288 for pacing rhythm). The overall accuracy, sensitivity (SN), specificity (SP), positive predictive value (PPV), and negative predictive value (NPV) of the ML derived AF detection algorithm were 95.53%, 95.94%, 95.17%, 94.56%, and 96.40% respectively. The sensitivity analysis included stable atrial paced rhythm during the procedure demonstrated similar results (accuracy 96.26%, SN 95.33%, SP 96.80%, PPV 94.56%, NPV 97.26%). The diagnostic algorithm showed stable diagnostic performance by different sample length.

Conclusion

The ML derived AF diagnostic algorithm of single-lead adhesive patch ECG monitoring could accurately diagnose the AF.