Aims: Catheter ablation of pulmonary veins is a treatment usually used in patients with paroxysmal atrial fibrillation in order avoid recurrences of the arrhythmia and maintain sinus rhythm. This study aimed to analyse the existence of significant variations in surface ECG after pulmonary vein isolation by means of functional data analysis.

Methods: 12 consecutive unselected patients suffering from paroxysmal atrial fibrillation who undergone catheter ablation were included in the study. Each patient was monitored in sinus rhythm before and after catheter ablation. Both surface ECG and intracavitary electrocardiogram recordings were simultaneously acquired. P-waves of bipolar lead II were delineated. Functional data were fitted from these segments and the first and second derivatives evaluated using them.

Results: Maximum first and second derivatives of the curves corresponding to P-waves resulted to decrease significantly when pulmonary veins were isolated (from 16.59±5.11 and 0.66±0.28 to 13.41±4.71 and 0.52±0.31, respectively). The use of these features could potentially help to identify the disconnection of pulmonary veins in a non invasive way.

Conclusion: The identification of the disconnection of pulmonary veins in patients suffering from paroxysmal atrial fibrillation who undergo catheter ablation can be perform by means of functional data analysis techniques. Future work will include further studies with larger cohorts of patients, but presented results could open a door to identify the spontaneous reconnection of pulmonary veins using non-invasive techniques.