Methods: We performed a retrospective analysis of all EP/DI procedures of the last 6 years. All procedures were performed by twelve operators routinely working at our Centre. During this period no institutional changes or recommendations about fluoroscopy use were performed.

Results: We reported complete fluoroscopy data on 7764 EP/DI procedures; 5931 EP procedures and 1813 DI. Table 1 reports median of 6-years radiation data. We reported complete fluoroscopy data on 7764 EP/DI procedures; 5931 EP procedures and 1813 DI. Table 1 reports median of 6-years radiation data; about fluoroscopy use were performed.

Over the 6-years period it was observed a significant trend reduction in fluoroscopy time and a consensual significant reduction in Effective Dose (ED), for atrial fibrillation (AF), atrial flutter, supraventricular tachycardia, ventricular tachycardia and premature ventricular contractions ablations, for electrophysiological studies and PM/ICD implantation (p<0.0001). Considering seven different epidermied and AF operators, we observed a significant variability of fluoroscopy time and ED between them (p<0.0001) and a significantly decreased trend of fluoroscopy use over time (p<0.0001) (Fig 1).

Figure 1

Fluoroscopy Use over Time

| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|------|------|------|------|------|------|------|
| DAP (cGy cm²) | 8623 | 3815 | 1968 | 15085 | 3538 | 395 |
| Effective Dose (mSv) | 18.9 | 10.1 | 8.8 | 6.0 | 3.9 | 1.3 |
| Fluoroscopy time (min) | 25 | 14 | 13 | 37 | 14 | 2 |

Conclusions: Electrophysiological procedures involve a non negligible use of X-ray. The awareness of the associated risks is fundamental and, together with technological advances, it can successfully optimize the use of fluoroscopy.

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Comparison of ventricular inducibility with late gadolinium enhancement and myocardial inflammation in endomyocardial biopsy in patients with dilated cardiomyopathy

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Background: Local voltage mapping is currently used to delineate infarct scar regions during arrhythmia ablation, but it is influenced by the direction of the activation wavefront. Myocardial impedance mapping can recognize scar tissue and theoretically, will not be influenced by the activation pattern as it measures passive electrical properties of the myocardium.

Purpose: This study aimed to assess the ability of impedance mapping to identify infarct scar tissue and its response to abrupt changes in cardiac activation pattern.

Methods: Three pigs were submitted to 150 min of left anterior descending coronary artery occlusion by catheter balloon; followed by reperfusion. Four weeks later, the animals developed a myocardial infarct scar that was confirmed by late gadolinium-enhanced cardiac magnetic resonance (LGE-CMR). All animals were submitted to endocardial voltage mapping of the left ventricle (LV) using the CARTO navigation system. Local tissue impedance was measured at the same voltage sites by injecting an alternating current of different excitation frequencies during the whole cardiac cycle. Measures were obtained in sinus rhythm (SR) and then repeated under right ventricular pacing (RVP). We calculated the tissue impedance magnitude and the amplitude of cyclic impedance changes at 41kHz, and the impedance phase angle at 307 kHz. By merging the LGE-CMR and CARTO data, we allocated each impedance measurement in the group “Healthy” if it had a low value of pixel intensity in the LGE-CMR (~40% of the highest pixel intensity) or “Scar” if it had a high value (~40%). The changes of voltage and impedance were evaluated as percentages using the formula: 100 [X_RVP-X_SR]/X_SR, where X_RVP are the values of voltage or impedance after right ventricular pacing, and X_SR are the values of voltage or impedance in sinus rhythm.

Results: A total of 87 measures of impedance were obtained (38 “healthy” and 49 “scar”), impedance mapping recognized appropriately the infarcted tissue since their absolute values were lower (p<0.001) in the scar than in healthy tissue: impedance= 53.2±9.92 vs 71.6±17.42, amplitude of impedance= 8.0±3.1 Ω vs 23.5±12.6 Ω, and phase angle= -11.9±3.3° vs -15.0±4.4°. As shown in the figure, in a subset of 36 paired measures of both endocardial voltage and impedance we found that right ventricular pacing modified the voltage but not the impedance data.

Conclusions: Endocardial impedance mapping permits recognition of infarct scar and is not affected by the pattern of cardiac activation. Thus, this technique emerges as a potential tool to improve catheter ablation of ischemic ventricular arrhythmias.

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