Diagnostic yield of Electroanatomic voltage mapping in guiding Endomyocardial biopsies; a comparison with an MRI-guided approach

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Background: Electroanatomic voltage mapping (EVM) is a promising modality for guiding Endomyocardial biopsies (EMB). Previous experiences on this techniques have reported safety and feasibility of this approach. These reports however, resulted limited by sample size or imperfect designs, preventing reliable comparisons of the effectiveness of this new methods with a conventional or a cardiac magnetic resonance (CMR) imaging guided approach.

Aim: We now report the largest cohort of patients undergoing EVM-guided EMB in order to show its diagnostic yield and comparing it with a cardiac magnetic resonance (CMR) guided approach.

Methods: One-hundred and sixty-two consecutive patients undergoing EMB at our Institution from 2010 to 2019 were included. Pathological areas identified at EVM and CMR underwent EMB. According to EMB results, CMR and EVM sensitivity and specificity regarding the identification of pathological substrates of myocardium were evaluated.

Results: A gadolinium-enhanced CMR had been performed in 143 (88.9%) of the population and yielded pathological findings in 121 (85.8%) of such cases. Late gadolinium enhancement (LGE) was present in 94 (70%) of the patients, while EVM identified areas of low voltages in 61%. Right (73%), left (19%) or both ventricles (8%) underwent sampling. EVM proved to have similar sensitivity to CMR (74% vs. 77%; P=0.479), with non-significantly higher specificity (70% vs. 47% P=0.738). In 12 patients with EMB-proven cardiomyopathy, EVM identified pathological areas, which had been undetected at CMR evaluation (concordance rate 53.8%; k = 0.26). Sensitivity of pooled EVM and CMR was as high as 95%. Five cases (3,8%) of cardiomyopathies were undetected by both CMR and EVM. Complications rate was low (4,9%), mostly vascular access related, with no patients requiring urgent management.

Conclusion: EVM proved to be a promising tool for targeted-EMB due to its sensitivity and specificity in identifying myocardial pathological substrates. EVM demonstrated to have an accuracy similar to CMR. EVM and CMR together conferred EMB a positive predictive value of 89%.

Sensitivity and Specificity of CMR, EVM

	Sensitivity, n (95% CI)	Specificity, n (95% CI)	PPV, n (95% CI)	NPV, n (95% CI)	Area under the curve, n (95% CI)	Accuracy, n (95% CI)
CMR	0.77 (0.69–86)	0.47 (0.31–0.64)	0.8 (0.76–0.84)	0.44 (0.36–0.52)	0.63 (0.50–0.76)	0.69
EVM	0.74 (0.66–0.83)	0.7 (0.56–0.83)	0.85 (0.82–0.89)	0.53 (0.47–0.6)	0.69 (0.58–0.82)	0.73
CMR+ or EVM+	0.95 (0.92–0.99)	0.32 (0.19–0.45)	0.77 (0.73–0.8)	0.75 (0.65–0.85)	0.56 (0.56–0.66)	0.77
CMR+ and EVM+	0.59 (0.5–0.69)	0.83 (0.72–0.94)	0.89 (0.86–0.93)	0.46 (0.41–0.52)	0.65 (0.55–0.75)	0.66

Continuous variables are expressed as number and 95% confidence interval (CI). EVM, Electroanatomic voltage mapping; CMR, cardiac magnetic resonance; NPV, negative predictive value; PPV, positive predictive value.