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Programmed ventricular stimulation for predicting arrhythmic events in patients with myocardial infarction: a systematic review and meta-analysis

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Background: Left ventricular ejection fraction (LVEF) is at present the main parameter used to guide the implantation of cardioverter-defibrillators (ICD) in patients with ischaemic cardiomyopathy. However, LVEF alone is a poor predictor of ventricular arrhythmias (VA) and sudden cardiac death (SCD). The majority of ICDs implanted for the primary prevention of SCD never deliver appropriate therapies, while being an expensive therapy and being potentially iatrogenic. Therefore, insertion of ICDs based solely on LVEF is not efficient and calls for an improvement in the risk-stratification of post-myocardial infarction patients. Inducibility of ventricular arrhythmias with programmed ventricular stimulation (PVS) has been used in the past to assess the risk of malignant arrhythmias. However, its current role in clinical practice is unknown.

Purpose: The aim of this meta-analysis was to study the role of PVS to predict future arrhythmic events in patients with previous myocardial infarction.

Methods: We performed a systematic review and a random-effect meta-analysis of studies reporting VAs –defined as SCD, sudden cardiac arrest, sustained monomorphic ventricular tachycardia (SMVT) or appropriate ICD therapies– after PVS in patients with ischaemic heart disease. Whenever possible, we used inducibility of SMVT as the positive response to PVS. Otherwise, we used the definition pre-specified in the corresponding study.

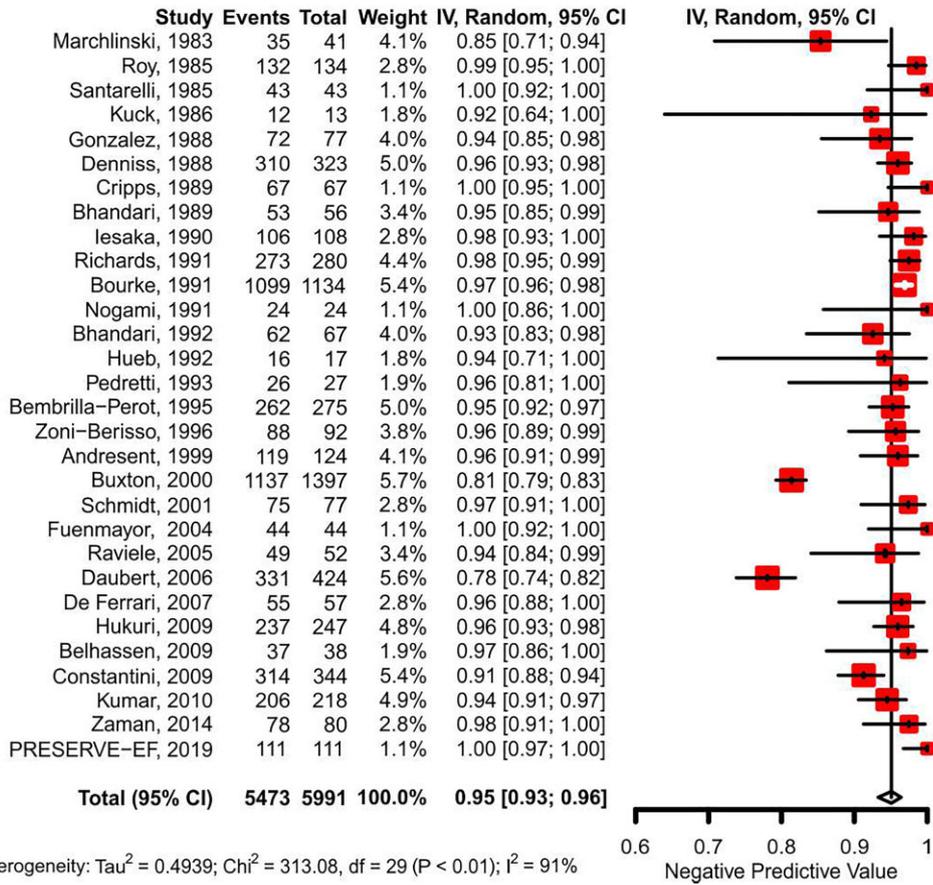
The primary outcome was to estimate the positive and negative predictive value (PPV and NPV, respectively) of PVS. Subgroup analyses were performed according to the PVS timing (<1 or ≥1 month after infarction), definition of a positive PVS, use of ICD, or study era (before or after 2000).

We searched in MEDLINE, EMBASE and Cochrane Library electronic databases up to November 2021.

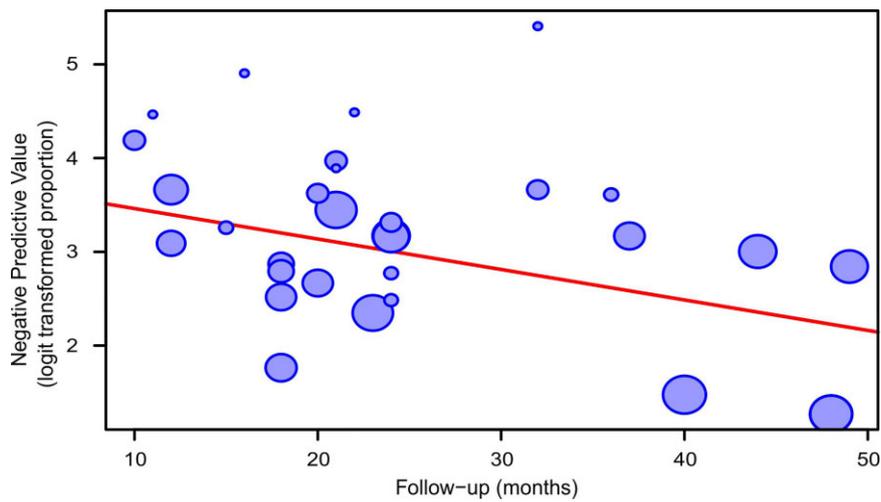
Results: Thirty studies were included with a total of 8253 patients (mean age 58.5 years, mean LVEF 38.8%). A total of 909 arrhythmic events occurred after a mean follow-up of 24.5 months. Overall, 23% (95% confidence interval [CI] 18-29%) of subjects had inducible arrhythmias with PVS. Inducibility was associated with a higher risk of subsequent VAs (odds ratio 6.26, 95% CI 3.97-9.89, p<0.001). The pooled NPV was 95%, (95% CI 93-96%, p<0.001) and the PPV was 25% (95% CI 20-31%, p<0.001). There was significant heterogeneity between studies (I² 78% for the odds ratio, 96% for the NPV and 68% for the PPV). There were no statistically significant differences in any of the values according to the pre-specified subgroups. Meta-regression showed a reduction of the NPV with longer follow-up (B coefficient –0.033; p=0.012).

Conclusion: PVS has a high NPV (95%) and could be useful to rule out subjects at low risk of arrhythmic events. However, it decreases with longer follow-ups and, thus, the arrhythmic risk may need to be reassessed.

Overall Negative Predictive Value



Pooled NPV of PVS



Meta-regression of NPV