

Aims: Electrical storm (ES) adversely affects prognosis of patients with structural heart disease and may become a life-threatening event. Catheter ablation (CA) has been proposed for the treatment of ES. Frequent episodes of polymorphic ventricular tachycardias/ventricular fibrillation (VT/VF) in patients with coronary artery disease can be triggered by monomorphic ventricular premature beats (VPBs) and thus, amenable to catheter ablation. Our goal was to evaluate the efficacy of CA ablation both in acute and long-term suppression of ES.

Methods: Fifty consecutive patients (age 59 ± 13 years, 8 female) with coronary artery disease (38), idiopathic dilated cardiomyopathy (5), arrhythmogenic right ventricular cardiomyopathy (6), and/or with combined aetiology (1) underwent CA for ES. Mean left ventricular ejection fraction (LVEF) was $29 \pm 11\%$. All patients underwent electroanatomical mapping, and CA was performed to abolish all inducible ventricular arrhythmias. Catheter ablation of electrical storm due to focally triggered polymorphic VT/VF was performed in nine patients. All 9 patients had previous myocardial infarction (MI) (interval of 3 days to 171 months). Electrical storm appeared either early after MI (till 1 month, group 1, $n=5$) or later (more than 1 month, group 2, $n=4$).

Results: The ES was suppressed by CA in 86% of patients. During the follow-up of 18 ± 16 months, 24 patients had no recurrences of any ventricular tachycardia (VT; 48%). Repeated procedure was necessary to suppress the recurrent ES in 13 cases (26%). Statistical analysis revealed that low LVEF (22 ± 3 vs. $31 \pm 12\%$; $p < 0.001$), increased LV end-diastolic diameter (72 ± 9.1 vs. 64 ± 8.9 mm; $p = 0.0135$), and renal insufficiency ($p < 0.001$) were the univariate predictors of early mortality or necessity for heart transplantation. Recurrence of ES despite previous CA procedure was associated with a higher risk of death or heart transplant during follow-up ($p < 0.05$). Based on mapping data, the ectopic beats originated from scar border zone on interventricular septum ($n=5$), inferior wall ($n=3$), and lateral wall ($n=1$). The mean QRS duration was 150 ± 29 ms and there was a significant difference between group 1 and 2 (130 ± 13 ms vs. 175 ± 25 ms; $p < 0.05$). The mean coupling interval of triggering beats was longer for patients in the second group (430 ± 30 ms vs. 359 ± 35 ms; $p < 0.05$) The ablation procedure prevented recurrence of ES in eight out of nine patients. During the follow-up, two patients died due to progressive heart failure. One patient had late recurrence of electrical storm due to ectopic beats of different morphology and was successfully reablated.

Conclusions: Catheter ablation is effective in acute suppression of ES and often represents a life-saving therapy. In the long term, it prevents recurrences of any VT in about half of the treated patients. Electrical storm due to focally triggered polymorphic VT/VF may occur not only in subacute phase of MI but also substantially later after index event. Triggering ectopic beats come mostly from Purkinje system. Catheter ablation of them can successfully abolish electrical storm and become a life-saving procedure.

Key words: electrical storm, ventricular tachycardia, catheter ablation, ectopic beats

