Interventional Treatment for HFrEF Patients with VT Episode

Bulent Gorenek MD FACC FESC

Eskisehir Osmangazi University
Cardiology Department
Eskisehir, Turkiye
Electrical storm, also referred to as arrhythmic storm, refers to multiple recurrences of ventricular arrhythmias over a short period of time.

Electrical storm is most commonly associated with acute MI and AHF.
In patients without ICDs, electrical storm has been variously defined as:

“the occurrence of two or more hemodynamically stable ventricular tachyarrhythmias within 24 hours, VT occurring immediately after termination, or sustained and non-sustained tachycardia resulting in a total number of ventricular ectopic beats greater than sinus beats in a 24 hour period.”
In patients with ICDs, the most widely accepted definition of electrical storm is:

“three or more appropriate therapies for ventricular tachyarrhythmias, including antitachycardia pacing or shocks.”

However, this definition may be somewhat inadequate as it fails to account for those ventricular tachycardias slower than the programmed detect rate of the device.
Causes of the Drug Resistant Sustained Ventricular Arrhythmias in HFrEF

- Acute heart failure
- Uncontrolled heart failure
- Ongoing ischemia
- Uncontrolled hypertension
- Electrolyte imbalance
- Enhanced sympathetic nervous system activity
- Errors in medication
- Proarrhythmic affects of antiarrhythmic drugs
Urgent PCI

2022 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death

Urgent reperfusion is the most important therapy, as acute ischaemia triggers arrhythmias.

European Heart Journal 2022; 43: 3997-4126
Catheter ablation has been used in a limited number of centres worldwide to target clearly identifiable EP triggers of VF and electrical storm, predominantly in the form of unifocal PVCs, with relatively good short-term success rates.

Europace 2012; 14.1687-1695
2022 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death

Catheter ablation is recommended in patients presenting with incessant VT or electrical storm due to SMVT refractory to AADs.\textsuperscript{330,331}

Catheter ablation should be considered in patients with recurrent episodes of PVT/VF triggered by a similar PVC, non-responsive to medical treatment or coronary revascularization.\textsuperscript{221,332,333}

European Heart Journal 2022; 43: 3997-4126
CENTRAL ILLUSTRATION: Role of Catheter Ablation in the Management of Patients With Structural Heart Disease

- Structural Heart Disease
  - Frequent PVCs or NSVT with LV Dysfunction
    - Catheter Ablation
      - Failure
        - AADs
      - Normal LV Function on Reassessment
        - No
          - ICD if LVEF ≤35%
        - Yes
          - ICD Not Indicated
  - Sustained MMVT
    - Single Episode
    - Recurrent VT
      - Incessant VT or VT Storm
        - Catheter Ablation
          - Failure
            - AADs
          - Consider VT Suppression
            - Catheter Ablation
              - Failure
                - AADs
            - ICD
  - Sustained PMVT or VF due to PVC Trigger
    - Catheter Ablation
      - Failure
        - AADs
      - ICD

Cardiac arrhythmias in acute coronary syndromes: position paper from the joint EHRA, ACCA, and EAPCI task force

Bulent Gorenek*†(Chairperson, Turkey), Carina Blomström Lundqvist‡(Sweden), Josep Brugada Terradellas‡(Spain), A. John Camm‡(UK), Gerhard Hindricks‡ (Germany), Kurt Huber‡(Austria), Paulus Kirchhof‡(UK), Karl-Heinz Kuck‡ (Germany), Gulmira Kudaiberdieva‡(Turkey), Tina Lin‡(Germany), Antonio Raviele‡ (Italy), Massimo Santini‡(Italy), Roland Richard Tilz‡(Germany), Marco Valgimigli‡(The Netherlands), Marc A. Vos‡(The Netherlands), Christian Vrints‡(Belgium), and Uwe Zeymer‡(Germany)

Document Reviewers: Gregory Y.H. Lip (Review Coordinator) (UK), Tatjana Potpara (Serbia), Laurent Fauchier (France), Christian Sticherling (Switzerland), Marco Roffi (Switzerland), Petr Widimsky (Czech Republic), Julinda Mehilli (Germany), Maddalena Lettino (Italy), Francois Schiele (France), Peter Sinnaeve (Belgium), Giuseppe Boriani (Italy), Deirdre Lane (UK), and Irene Savelieva (on behalf of EP-Europace, UK)
Catheter ablation of sustained VA in ACS

**Indications:**
- Patients with sustained VT refractory to other non-pharmacological and AAD treatment
- Patients with ES

**Setting**
- Catheter ablation procedure requires experienced electrophysiologists
- Consider transfer to high volume VT ablation centre when experienced operators are not available

**Technique:**
- Suppression of the triggering PVC and loss of Purkinje potentials
- Substrate-guided ablation in un-mappable VA
Temporary pacing

Repetitive MVT requiring overdrive pacing, which can terminate the arrhythmia until proper drug or ablative therapy can be instituted.

One commonly used method is to "burst" pace at progressively more rapid rates.

When using overdrive pacing for VT termination, backup defibrillation must be available since VF can be provoked.

If the patient has refractory PVT in the setting of bradycardia to a rate less than 60 beats per minute or a long QTc, temporary pacing at a higher rate may be instituted.
Transvenous catheter overdrive stimulation should be considered if VT is frequently recurrent despite use of anti-arrhythmic drugs and catheter ablation is not possible.
In high risk patients prophylactic use of IABC may decrease the incidence of VF, especially in patients with cardiogenic shock.

Am J Cardiol 1999;84:18-23
Impella and Tandem Heart use in VT ablation facilitates extensive activation mapping of several unstable VTs and requires fewer rescue shocks during the procedure when compared with using IABP.

*Circ Arrhythm Electrophysiol* 2014;7:244-250
Institution of mechanical circulatory support may be considered in the management of drug-refractory electrical storm and cardiogenic shock.\textsuperscript{335}
Renal Sympathetic Denervation as an Adjunct to Catheter Ablation for the Treatment of Ventricular Electrical Storm in the Setting of Acute Myocardial Infarction

BORIS A. HOFFMANN, M.D., B.Sc.,* DANIEL STEVEN, M.D.,* STEPHAN WILLEMS, M.D.,* and KARSTEN SYDOW, M.D.†
Stellate ganglion block may be helpful although few centers have experience with this intervention.

J Cardiovasc Electrophysiol. 2013; 24; 926-928
2022 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death

Autonomic modulation may be considered in patients with electrical storm refractory to drug treatment and in whom catheter ablation is ineffective or not possible. 326,328,340

European Heart Journal 2022; 43: 3997-4126
In patients with a pre-existing ICD device programming should be reviewed to determine the appropriateness of therapy and the need for device reprogramming (optimizing anti-tachycardia pacing and ICD shocks).
Porsuk River, Eskisehir