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Ablation of ventricular tachycardia

Ablation ventrikulärer Tachykardie


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Abstract  Ablation is an important management tool for the treatment of ventricular arrhythmias. Even at experienced centers ventricular tachycardia ablation carries a minor but significant risk for potential complications, including vascular and thromboembolic complications, air embolism, volume overload and the precipitation of congestive heart failure, cardiac tamponade from catheter perforation or from steam pop with RF energy delivery, valve or subvalvular support structure disruption, conduction system disruption with development of heart block, coronary artery injury when ablating in the coronary cusps region or trying to gain access to the LV chamber, precipitation of cardiogenic shock from ablation of viable myocardium in patients with marginal reserve and failure to resuscitate or precipitation of cardiogenic shock from repeated VT induction, and with epicardial ablation...
the potential complications of epicardial access, coronary arteries and phrenic nerve damage. Recognition of these risks is paramount for their avoidance with careful pre-procedure planning and intraprocedural technique being essential to minimize the potential for complications.

**Key words** ventricular tachycardia – catheter ablation – complications – heart failure – tamponade

**Introduction**

Ventricular tachycardia (VT) ablation has evolved into an important management option for patients with symptomatic ventricular arrhythmias. Device therapy, although effective in terminating most arrhythmias, rarely does so without some episodes requiring poorly tolerated shock therapy because of pacing acceleration or inefficacy. Frequently patients experience flurries of VT episodes not uncommonly resulting in multiple shocks and significant psychological trauma. Ablative therapy offers an important option for VT control with the potential for long-term arrhythmia elimination. Even at experienced centers VT ablation carries a small but significant risk of mortality and morbidity [1]. We will describe the approach to catheter ablation of VT used in our center to optimize outcome and minimize risk. In the process of doing so we will discuss specific potential risks and complications.

**Preparation prior to the ablation procedure**

The first step in the approach to VT ablation to minimize risk related to ablation is the necessary thorough evaluation of the patient's clinical status before the procedure. Each patient should undergo careful clinical evaluation so that the strategy used in ablative therapy can be appropriately individualized and risk minimized [2]. Determination of the substrate for the arrhythmia is critical. Coronary disease status and potential risk for ischemia should be assessed in most patients with cardiac catheterization and physiologic stress test to delineate the presence and extent of vascular compromise and the amount of scar/ischemia as well its location. Patients with structural heart disease presenting with ventricular arrhythmias usually have decreased RV and/or LV function, variable degrees of symptomatic heart failure and in many cases limited reserve. Deaths attributable to the procedure are frequently related to an inadequate assessment and management of ischemic burden and fluid overload prior to and during the procedure, especially in the setting of prolonged procedures and use of opened irrigated ablation catheters. Intravascular volume status and intracardiac hemodynamics should be optimized prior to the procedure. In selected patients, the need for ongoing intraaortic balloon pump or external circulatory support may be identified and instituted prior to the procedure.

Detailed documentation of prior and current antiarrhythmic drug therapy is necessary. Since most patients with structural heart disease come to the electrophysiology laboratory on high dose amiodarone therapy, this must be considered as a potential confounder in interpreting the adequacy of ablation and may influence the ablation strategy and endpoints used.

Severe LV dysfunction and ventricular aneurysms, the most common substrate for sustained ventricular arrhythmias, are also significant risk factors for LV thrombus. Documentation of anticoagulation status prior to the procedure if indicated and exclusion of the presence of an unstable left ventricular thrombus is routinely performed with echocardiography and LV opacification for better delineation of the endocardial surface. The presence of a sessile thrombus remains a contraindication to catheter-based VT ablation. If laminated thrombus is suspected, a several week period of empiric anticoagulation with warfarin may be considered before considering performing the procedure. Importantly these laminated thrombi are typically adherent and do not pose a significant risk. If clinical circumstances dictate based on VT recurrence then the ablation procedure can be performed and any potential risk accepted.

Successful ablation is critically dependent on a clear definition of the electrophysiologic substrate and identification of the VT origin. Both will be facilitated by pre procedure assessment of scar location using the appropriate imaging tools. Certainly those patients with nonischemic left or right ventricular cardiomyopathy should undergo magnetic resonance imaging if an ICD device has not been implanted. In addition, all ECG information related to spontaneous VT events should be collected. The 12-lead ECG recordings of the “clinical” arrhythmia are ideal for more precise identification of VT circuit exit. However, in lieu of the 12-lead, single or dual lead telemetry monitoring can at least help with the bundle branch block morphology and axis of the VT if leads V1 and II are used. We have found the recordings from the ICD device very helpful in most