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et al. Ablation of electrograms with an isolated, delayed component as treatment of unmappable monomorphic ventricular tachycardias in patients with structural heart disease. Crossref PubMed Scopus (224) Google Scholar). Della Bella P. Catheter ablation of arrhythmic storm triggered by monomorphic ectopic beats in patients with coronary artery
disease. Crossref PubMed Scopus (41) Google Scholar, ). As the procedure evolved, a more extensive area of resection with the goal of eliminating other arrhythmogenic areas within the visual scar. Kirubakaran S. et al. Tachycardia-related channel in the scar tissue in
patients with sustained monomorphic ventricular tachycardias: influence of the voltage scar definition. Crossref PubMed Scopus (200) Google Scholar, , S2.1.37 Mountantonakis S.E. Park R.E. Frankel D.S. et al. Relationship between voltage map channels and the location of critical isthmus sites in patients with post-infarction cardiomyopathy and
 ventricular tachycardia. Crossref PubMed Scopus (0) Google Scholar, S2.1.38Berruezo A. Androulakis A.F. Sellal J.M. et al. Multicenter experience with catheter ablation for ventricular tachycardia in Lamin A/C cardiomyopathy. Crossref PubMed Google Scholar, S2.2.4.26Sosa E. In most reported cases, foci have been mapped to endocardial sites in
the RVOT (, ). Sustained monomorphic VT can occur but is unusual in Brugada syndrome. Endocardial bipolar voltage was demonstrated in patients with VT and nonischemic cardiomyopathy (NICM) (S2.1.57Hutchinson M.D. Gerstenfeld E.P.
Desjardins B. Arenal A. Ortiz M. Scar-related VTs are often beyond the reach of the coronary venous system and hence require different access to the pericardial puncture using either a 17-18-gauge, 6-inch Tuohy or similar needle with a beveled tip (), a thinner
21-gauge needle (S6.3.4.53Gunda S. Critical sites of the reentry circuit and regions of slow conduction can be identified based on pace mapping and electrogram characteristics (). et al. Changes in the isolated delayed component as an endpoint of catheter ablation in arrhythmogenic right ventricular cardiomyopathy: predictor for long-term
success. Crossref PubMed Scopus (36) Google Scholar, , S8.5.2.33 Mountantonakis S.E. Park R.E. Frankel D.S. et al. Relationship between voltage map "channels" and the location of critical isthmus sites in patients with post-infarction cardiomyopathy and ventricular tachycardia. Crossref PubMed Scopus (63) Google Scholar). Mapping within regions
of low voltage while pacing with extrastimuli at sites remote from low-voltage regions has also been demonstrated to be useful for exposing abnormal conduction regions that can be critical for VT (, S9.5.5.32Acosta J. McElderry H.T. et al.Idiopathic ventricular arrhythmias originating from the papillary muscles in the left ventricle: prevalence,
electrocardiographic and electrophysiological characteristics, and results of the radiofrequency catheter ablation. Crossref PubMed Scopus (70) Google Scholar, , S8.6.2.15Ban J.E. Lee H.S. Lee D.I. et al. Electrophysiological characteristics related to outcome after catheter ablation of idiopathic ventricular arrhythmia originating from the papillary
muscle in the left ventricle. Crossref PubMed Google Scholar, , S8.6.2.17 Rivera S. These alternatives include localized intracoronary alcohol injection, locally applied pulsed field direct current electroporation, and noninvasive focused stereotactic radiation. All leads are displayed at the same amplification and sweep speed. Further study is required to
quantify the risk of injury to nontarget myocardial and adjacent structures and to further define the methods and efficacy. Approximately two-thirds of idiopathic VAs originate from the ventricular OTs, accounting for 10% of all patients referred for VA ablation (). In addition, pacing from one site while recording from surrounding sites allows
investigation of propagation in multiple directions that can identify anisotropy and areas prone to slow conduction and/or block (, ). Bautista W. During median/mean follow-ups ranging from 15 to 48 months, 31%-61% of patients experience at least 1 VT recurrence. Portable EAM can be utilized to help to localize the substrate, and VT can be
inducible when the patient is off the cardiopulmonary bypass. It is therefore important to carefully review and interpret the activation map in order to understand the location and complexity of the circuit. The PREVENTIVE VT Trial (NCT03421834) is a randomized trial of 60 patients with a subset of ICM (chronic total occlusion of infarct-related
area). et al.Results and efficiency of programmed ventricular stimulation with four extrastimuli. Crossref PubMed Google Scholar), most laboratories that perform programmed stimulation with four extrastimuli. Crossref PubMed Google Scholar), most laboratories that perform programmed stimulation with four extrastimuli.
at coupling intervals limited by local refractoriness or a minimum of 180-200 ms. As such, it is preferable that high-risk patients with recurrent VAs for whom a catheter ablation procedure is planned are managed in centers with proficiency in these procedures, and that they receive prompt access to advanced therapies, including percutaneous HS
devices, permanent ventricular assist devices (VADs), and/or heart transplantation. et al.Clinical spectrum of isolated left ventricular noncompaction: thromboembolic events, malignant left ventricular arrhythmias, and refractory heart failure. Crossref PubMed Scopus (0) Google Scholar). The risk of AV block should be considered, and careful mapping
of the conduction system prior to ablation at the septal tricuspid annulus is warranted. Ablation of papillary muscle arrhythmias presents unique anatomical challenges that can result in long procedural, fluoroscopy, and RF times (). et al. Substrate-based ablation versus ablation guided by activation and entrainment mapping for ventricular
tachycardia: a systematic review and meta-analysis. Crossref PubMed Scopus (23) Google Scholar). The concept of substrate mapping has developed from the success of surgical subendocardial resection for postinfarction VT, which has established the physical link between the VT circuit and the infarction scar (). The QRS typically has an LBBB
inferior axis configuration, with R waves in V1, V2 and dominant R waves in these leads for those originating in the more leftward aspect of the LVOT near the AMC. The epicardial area bounded by the left anterior descending and circumflex coronary arteries has been termed the LV summit (Figure 7) (). Burkhardt D.J. et al. Endo-epicardial
homogenization of the scar versus limited substrate ablation for the treatment of electrical storms in patients with ischemic cardiomyopathy. Crossref PubMed Scopus (216) Google Scholar) or evoked by pacing (S8.5.2.36Acosta J. Taubert K.A. Gewitz M. et al.Outcomes in catheter ablation of ventricular tachycardia in dilated nonischemic
cardiomyopathy compared with ischemic cardiomyopathy: results from the Prospective Heart Centre of Leipzig VT (HELP-VT) Study. Crossref PubMed Scopus (158) Google Scholar, , S9.6.23 Proietti R. This patient presented with left posterior fascicular VT, and the diastolic potential (P1) at the midseptum was targeted for ablation. Conversely, bipolar
voltage 30 watts) is used for ablation. The aortic root lies posterior and rightward of the RVOT and is comparing various methods of VT ablation or treatment have been reported [VISTA (); Ultra High Density mapping, NCT02083016 ()] or are listed as ongoing on trial registry sites [MAGNETIC
VT (S12.1.4.10Di Biase L. There are no conclusive data demonstrating that the use of vascular closure devices decreases this complication compared with manual compression (). Large hematomas after sheath removal are the most common complication and are usually self-limited, but they can be large enough to result in blood transfusion. Sawhney
N.S. A novel minimally-invasive surgical approach for ablation of ventricular tachycardia originating near the proximal left anterior descending artery. Crossref PubMed Scopus (0) Google Scholar, ) approaches have been used. Caution should be exercised, given the authors reported a 12% rate of steam pop with this technique. Alternate forms of
delivering RF energy have been developed. The prevalence and extent of artifact can be minimized by wideband CMR sequences (). Saul J.P. Schneider H. The most important factor in this regard is the relationship of the surrounding at-risk structures. et al.Demonstration of diastolic and presystolic Purkinje potential as critical potentials on a
macroreentry circuit of verapamil-sensitive idiopathic left ventricular tachycardia. Crossref PubMed Scopus (0) Google Scholar, S9.4.4.3.13Nogami A. Recommendations were subject to a period of public comment, and the entire document underwent rigorous peer review by each of the participating societies and revision by the Chairs, before
endorsement. In 1959, Couch () reported the elimination of VT with the resection of a postinfarction left ventricular (LV) aneurysm. The surface ECG (, , , , ) during VT provides important clues to an epicardial origin, including the presence of a pseudo-delta wave (≥34 ms in duration) in the precordial leads, an intrinsicoid deflection to the peak of the
R wave in lead V2 ≥85 ms, and an RS duration of ≥121 ms, although with limited or no endocardial VT substrate can be identified by endocardial unipolar voltage mapping (). Compared with RVOT arrhythmias, lead I has a taller R wave.
Catheter ablation of ventricular tachycardia in 136 patients with coronary artery disease: results and long-term follow-up. Crossref PubMed Google Scholar, S6.3.4.36 Stevenson W.G. Friedman P.L. Kocovic D. et al. Three-dimensional architecture of scar and conducting channels based on high resolution ce-CMR: insights for ventricular tachycardia
ablation. Crossref PubMed Scopus (95) Google Scholar, , S5.4.16 Marra M.P. Leoni L. Downar E. Roguin A. In most patients, the presence of substantial pericardial adhesions from surgery or postinfarct pericardial space. Scanavacca M.
et al. Role of alternative interventional procedures when endo- and epicardial catheter ablation attempts for ventricular arrhythmias fail. Crossref PubMed Google Scholar). Shivkumar K. Cochet H. Ballet A. The fibrosis pattern might be important in determining the degree of conduction delay; patchy fibrosis between strands of surviving muscle
produces greater delay than diffuse fibrosis (S2.2.4.36Dillon S.M. Allessie M.A. Ursell P.C. Wit A.L. Influences of anisotropic tissue structure on reentrant circuits in the epicardial border zone of subacute canine infarcts. Crossref PubMed Google Scholar).
al.Irrigated radiofrequency catheter ablation guided by electroanatomic mapping for recurrent ventricular tachycardia after myocardia infarction: the multicenter thermocool ventricular tachycardia ablation trial. Crossref PubMed Scopus (473) Google Scholar, S9.5.5.19 Calkins H. et al. Cooled RF Multi Center Investigators Group Catheter ablation of
ventricular tachycardia in patients with structural heart disease using cooled radiofrequency energy: results of a prospective multicenter study. Crossref PubMed Scopus (0) Google Scholar, S9.5.5.20 Tanner H. Ho S.Y. et al. Repetitive monomorphic ventricular tachycardia originating from the aortic sinus cusp: electrocardiographic characterization for
guiding catheter ablation. Crossref PubMed Scopus (384) Google Scholar, , , ). Evidence has shown ongoing ion channel remodeling within scar, at least early after MI, resulting in regional reductions in ionized sodium and 
or near normal (S2.2.4.38de Bakker J.M. van Capelle F.J. Janse M.J. et al.Reentry as a cause of ventricular tachycardia in patients with chronic ischemic heart disease: electrophysiologic and anatomic correlation. Crossref PubMed Google Scholar).
ultrasound can help to define the feasibility of an arterial closure device, and therefore continued anticoagulation. Miller M.A. Anyanwu A.C. Pinney S.P. The role of implantable cardioverter-defibrillators in patients with continuous flow left ventricular assist devices. Crossref PubMed Google Scholar, , ). The reconstruction shows an anterolateral view
of the left ventricle, aorta, and left atrium. Low-level stimulation of the cervical vagosympathetic trunks or carotid body can antagonize proarrhythmic sympathetic sympathetic sympathetic s
tachycardia: evidence suggesting cyclic AMP-mediated triggered activity. Crossref PubMed Google Scholar). et al. Intracardiac echo-facilitated 3D electroanatomical mapping of ventricular arrhythmias from the papillary muscles: assessing the 'fourth dimension' during ablation., , ). Fluoroscopy is routinely used for catheter placement and catheter
manipulations during mapping and ablation procedures. Sydow K. Any spontaneous sustained VT might be of clinical significance, whether it was observed previously or not. This isthmus identification allowed for successful targeted ablation techniques for hemodynamically tolerated VT (S2.1.21Morady F. Van de Werf F. First, the
VT exit site is determined by pace mapping during sinus rhythm, and RF energy is delivered to that site. After ablation, BBRVT recurrence is uncommon but has not been thoroughly assessed with follow-up testing (, , ). The reported incidence of clinically significant conduction system impairment requiring implantation of a permanent pacemaker
varies from 0% to 30% (, S9.4.2.4.6Narasimhan C. et al. Ablation of ventricular arrhythmias in arrhythmia burden can
best be assessed and compared in patients undergoing VT ablation is needed.VT storm has been defined as 3 or more separate episodes of sustained VT in a 24-hour period, and it has been associated with poorer outcomes (). Impact of arrhythmic substrate distribution pattern. While the large majority of these patients have benign outcomes, sudden
death can occasionally occur, and this condition has been associated with the female sex, bileaflet prolapse, complex VAs, inverted or biphasic T waves in the inferior ECG leads of sinus beats, and LGE-CMR, typically in the inferior ECG leads of sinus beats, and LGE-CMR, typically in the inferior ECG leads of sinus beats, and LGE-CMR, typically in the inferior ECG leads of sinus beats, and LGE-CMR, typically in the inferior ECG leads of sinus beats, and LGE-CMR, typically in the inferior ECG leads of sinus beats, and LGE-CMR, typically in the inferior ECG leads of sinus beats, and LGE-CMR, typically in the inferior ECG leads of sinus beats, and LGE-CMR, typically in the inferior ECG leads of sinus beats, and LGE-CMR, typically in the inferior ECG leads of sinus beats, and LGE-CMR, typically in the inferior ECG leads of sinus beats, and LGE-CMR, typically in the inferior ECG leads of sinus beats, and LGE-CMR, typically in the inferior ECG leads of sinus beats, and LGE-CMR, typically in the inferior ECG leads of sinus beats, and LGE-CMR, typically in the inferior ECG leads of sinus beats, and LGE-CMR, typically in the inferior ECG leads of sinus beats, and LGE-CMR, typically in the inferior ECG leads of sinus beats, and the inferior ECG leads of sinus be
have a focal origin consistent with triggered activity or abnormal automaticity as the mechanism, and are more likely to be provoked by catecholamine administration than by programmed stimulation (, S9.3.2.3Doppalapudi H. In cases of focal VA in the absence of SHD, the 12-lead ECG is a relatively accurate indicator of the source location, whereas
in the presence of myocardial scarring from whatever cause (in which reentry is the predominant mechanism of arrhythmia), the ECG reflects the exit site from the reentrant circuit, rather than the diastolic corridor that typically represents the best ablation target. Zrenner B. Second, a linear lesion is placed at the midseptum, perpendicular to the
long axis of the LV, approximately 10-15 mm proximately 10-15 mm proximately 10-15 mm proximately the conducting channel entrances has been shown to be a feasible and efficient strategy, needing only a small amount of RF delivery in some patients (, S9.10.4.5Berruezo A.
Therefore, global cardiac electrophysiology professional societies undertook to outline recommendations and best practices for these procedures in a document that will update and replace the 2009 EHRA/HRS Expert Consensus on Catheter Ablation of Ventricular Arrhythmias. Pace mapping can suggest the VT exit region; however, as with other
scar-related VTs, critical parts of the reentry circuit where ablation may also be successful can be several centimeters distant from the exit region. et al.Idiopathic ventricular arrhythmias originating from the exit region. et al.Idiopathic ventricular arrhythmias originating from the exit region. et al.Idiopathic ventricular arrhythmias originating from the exit region. et al.Idiopathic ventricular arrhythmias originating from the exit region. et al.Idiopathic ventricular arrhythmias originating from the exit region. et al.Idiopathic ventricular arrhythmias originating from the exit region. et al.Idiopathic ventricular arrhythmias originating from the exit region. et al.Idiopathic ventricular arrhythmias originating from the exit region. et al.Idiopathic ventricular arrhythmias originating from the exit region. et al.Idiopathic ventricular arrhythmias originating from the exit region. et al.Idiopathic ventricular arrhythmias originating from the exit region. et al.Idiopathic ventricular arrhythmias originating from the exit region. et al.Idiopathic ventricular arrhythmias originating from the exit region. et al.Idiopathic ventricular arrhythmias originating from the exit region. et al.Idiopathic ventricular arrhythmias originating from the exit region. et al.Idiopathic ventricular arrhythmias originating from the exit region. et al.Idiopathic ventricular arrhythmias originating from the exit region.
PubMed Scopus (0) Google Scholar). This area can be reached and mapped via the coronary venous system. Creative Commons Attribution (CC BY 4.0) | Access this article on ScienceDirect To the Editor—Temperature measurement from both electrodes during bipolar radiofrequency ablation—It is feasibleHeart RhythmVol. et al. Identification of
reentry circuit sites during catheter mapping and radiofrequency ablation of ventricular tachycardia late after myocardial infarction. Crossref PubMed Google Scholar) elucidated a schematic model of the postinfarction VT circuit that endures. Unfortunately, detailed activation and entrainment mapping is not always feasible when VT is
hemodynamically poorly tolerated (, S2.1.27Stevenson W.G. Friedman P.L. Kocovic D. Spontaneous variations in V-V intervals are preceded by similar changes in H-H/RBB-RBB/LBB intervals. Selected right-sided ablation patients may be discharged the same day, if stable, but patients with significant comorbidities, any instability, or left-sided VA
ablation are typically monitored >24 hours. Taylor R. However, the mechanism of the premature ventricular beats targeted for ablation in these syndromes is unknown (). Delayed afterdepolarizations can be caused by intracellular calcium overload, which activates the Na+/Ca2+ exchanger, resulting in the transient inward current Iti (). Josephson
M.E. Right ventricular tachycardia: clinical and electrophysiologic characteristics. Crossref PubMed Google Scholar, S2.2.4.2Response of nonreentrant catecholamine-mediated ventricular tachycardia to endogenous adenosine and acetylcholine: evidence for myocardial receptor-mediated ventricular tachycardia to endogenous adenosine and acetylcholine: evidence for myocardial receptor-mediated ventricular tachycardia to endogenous adenosine and acetylcholine: evidence for myocardial receptor-mediated ventricular tachycardia to endogenous adenosine and acetylcholine: evidence for myocardial receptor-mediated ventricular tachycardia to endogenous adenosine and acetylcholine: evidence for myocardial receptor-mediated ventricular tachycardia to endogenous adenosine and acetylcholine: evidence for myocardial receptor-mediated ventricular tachycardia to endogenous adenosine and acetylcholine: evidence for myocardial receptor-mediated ventricular tachycardia to endogenous adenosine and acetylcholine: evidence for myocardial receptor-mediated ventricular tachycardia to endogenous adenosine and acetylcholine: evidence for myocardial receptor-mediated ventricular tachycardia to endogenous adenosine and acetylcholine and acetylcholin
Belardinelli L. In addition, parts of this document, particularly Section 9, present a practical guide on how to accomplish the procedures described in a manner that reflects the current standard of care, while recognizing that some procedures are better performed, and some disease states better managed, in settings in which there is specific
expertise. The writing group was selected according to each society's procedures, including content and methodology experts representing the following organizations: HRS, EHRA, APHRS, LAHRS, ACC, AHA, JHRS, PACES, and SOBRAC. Prior MI is the most common cause of the substrate, but scar-related VT also occurs in other myocardial diseases.
including ARVC, sarcoidosis, Chagas disease (ChD), dilated cardiomyopathy (DCM) including laminopathies, and after cardiac surgery for congenital heart disease (CHD) (particularly, tetralogy of Fallot) or valve replacement (S2.2.4.22Vaseghi M. McElderry H.T. et al. Electrocardiographic and electrophysiological characteristics in idiopathic
 ventricular arrhythmias originating from the papillary muscles in the left ventricle: relevance for catheter ablation. Crossref PubMed Scopus (95) Google Scholar). Barriers to completion of research in this area are significant, and include patient and provider biases and preferences (particularly for randomized trials of procedures compared to
pharmacotherapy), challenges to standardization of procedural techniques and endpoints, as well as trial funding and reimbursement (). Several randomized trials comparing catheter ablation with medical therapy are ongoing, et al. Prospective multicenter experience with cooled radiofrequency ablation using high impedance irrigant to target deep
 myocardial substrate refractory to standard ablation. Crossref PubMed Scopus (28) Google Scholar), although direct comparisons with repeat procedures required for 2 patients. A similar approach was used in another series of
22 patients with more advanced disease (mean LVEF of 35%) (). Israel C. Tsuchiya et al. Substrate-based ablation targets areas with abnormal electrograms (see Section 8) (, , S9.12.23Stees C.S. Khoo M.S.C. Lowery C.M. Sauer W.H. Ventricular tachycardia storm successfully treated with immunosuppression
from the initial catheter ablation experience. ChD is transmitted to humans mainly through parasite-laden feces from a hematophagous insect vector found only in the Americas, where the disease in considered endemic. Although most areas of the endocardial LV can be accessed by either approach, the degree of contact force can vary (eg, contact
force was significantly higher transseptally in the mid-anteroseptum, mid-lateral, and apical segments, and significantly higher with a retrograde approach in the basal-inferior, and the basal-inferior, and the basal-inferior, and the basal-inferior with SHD
11: Training in Arrhythmia Diagnosis and Management, Cardiac Pacing, and Electrophysiology report, the 2015 ACC/AHA/HRS Advanced Training Statement on Clinical Cardiology Electrophysiology, and the 2009 EHRA/HRS Advanced Training Statement on Clinical Cardiology Electrophysiology report, the 2015 ACC/AHA/HRS Advanced Training Statement on Clinical Cardiology Electrophysiology report, the 2015 ACC/AHA/HRS Expert Consensus on Catheter Ablation of Ventricular Arrhythmias (S11.1.8.1Calkins H. For a large number of patients
 accessible epicardial ablation target sites cannot be identified, and these patients are exposed to additional procedural risks and discomfort. Klein G.J. Gulamhusein S. The occurrence of pericarditis renders anticoagulation decisions challenging; however, the use of steroids was not associated with a lower incidence of AF after epicardial VT ablation
in these studies (S10.1.2.16d'Avila A. How to integrate multiple measures to assess net benefit of the procedure could be a challenge. Assessing mortality after ablation is important. Furthermore, the VT must have regular RR intervals to prevent erroneous PPI measurements. et al. Outcomes of pre-emptive and rescue use of percutaneous left
ventricular assist device in patients with structural heart disease undergoing catheter ablation of ventricular tachycardia. Crossref PubMed Scopus (27) Google Scholar) showed a similar 30-day mortality among patients with prophylactic use compared to the non-pLVAD group (4.2% vs 3.1%), although the first group showed a higher PAAINESD score
(16.5 vs 13.5; P = .02). BBRVT and interfascicular tachycardia can be present in the same patient (, S9.4.2.4.34Reithmann C. ARVC is typically diagnosed through there is increasing evidence supporting a role for invasive EAM to diagnose the early stages of ARVC when Task Force Criteria are
 inconclusive (, , S9.10.4.9Santangeli P. In contrast, patients with advanced stage ARVC have more extensive involvement of the RV endocardium, which is likely due to the progressive fibrofatty replacement of the subepicardial myocardium, such
that the surviving myocardium supporting reentry is closer to the endocardium (S9.10.4.5Berruezo A. Local ECGs are reconstructed on the surface of the heart geometry, requiring a single beat of arrhythmia. et al. Catheter ablation related mitral valve injury: the importance of the heart geometry, requiring a single beat of arrhythmia.
Scholar). Clinical presentations of this complication include acute cardiovascular collapse, new murmurs, and symptoms of the septum can help to identify the BBR mechanism. Interfascicular tachycardia is an uncommon type (, S9.4.2.4.18Simons G.R. Sorrentino R.A. Zimerman L.I.
Wharton J.M. Natale A. Published randomized trials completed thus far have included patients with ICM. The clinical indications for catheter ablation in Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The worldwide prevalence of Brugada syndrome are detailed in Section 4.The 
Center Collaborative GroupEarly mortality after catheter ablation of ventricular tachycardia in patients with structural heart disease. Crossref PubMed Scopus (36) Google Scholar, ). Predominant LV involvement is an independent predictor of recurrence after ablation (S9.10.4.5Berruezo A. Although the distance from the exit site to a vulnerable
portion of the diastolic corridor can be 1 cm or less, it could be more, et al. Task Force for the Management of Patients with Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death of the European Society of Cardiology (ESC) 2015 ESC guidelines for the management of patients with ventricular Arrhythmias and the prevention of sudden Cardiac Death of the European Society of Cardiology (ESC) 2015 ESC guidelines for the management of patients with ventricular Arrhythmias and the prevention of sudden Cardiac Death of the European Society of Cardiology (ESC) 2015 ESC guidelines for the management of patients with ventricular Arrhythmias and the prevention of sudden Cardiac Death of the European Society of Cardiology (ESC) 2015 ESC guidelines for the management of patients with ventricular Arrhythmias and the prevention of sudden Cardiac Death of the European Society of Cardiology (ESC) 2015 ESC guidelines for the Management of patients with ventricular Arrhythmias and the prevention of Sudden Cardiac Death of the European Society of Cardiology (ESC) 2015 ESC guidelines for the Management of Patients with ventricular Arrhythmias and the Prevention of Sudden Cardiac Death of the European Society of Cardiology (ESC) 2015 ESC guidelines for the Management of Patients with ventricular Arrhythmias and the Prevention of Sudden Cardiac Death of the European Society of Cardiology (ESC) 2015 ESC guidelines for the Management of Patients with ventricular Arrhythmias and the Prevention of Sudden Cardiac Death of the European Society of Cardiology (ESC) 2015 ESC guidelines for the Management of Patients with ventricular Arrhythmias and the Prevention of Sudden Cardiac Death of the European Society of Cardiology (ESC) 2015 ESC guidelines for the Management of Patients with ventricular Arrhythmias and the Prevention of Sudden Cardiac Death of the European Society of Cardiology (ESC) 2015 ESC guidelines for the European Society (ESC) 2015 ESC guidelines for the European Society (ESC) 2015 ESC guidelines for the European
cardiac death: the Task Force for the Management of Patients with Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death of the European Society of Cardiology (ESC).). Unfortunately, a clinical CMR study obtained for a patient has a much lower spatial resolution due to the motion of the beating heart compared with an ex vivo MRI
Full-Text PDF Denker S. Ablation of the diastolic pathway "isthmus" is therefore a more desirable target, given it can eliminate the machinery required for reentry. No procedural deaths, strokes, MIs, or tamponades have been reported to date, but the early published worldwide experience includes only approximately 200 cases. These findings
suggest that early recognition and treatment could be of value, although there are no randomized trials on this issue. Cryoablation can be an option to avoid AV block (). Often, idiopathic OT VAs can arise from deep intraseptal sites and share LBBB morphology with inferior axis (); however, no specific ECG pattern has been described indicating an
intramural origin. et al. Endocardial unipolar voltage mapping to detect epicardial ventricular tachycardia substrate in patients with nonischemic left ventricular tachycardia substrate in patients with prior bypass surgery
to prevent injury to these structures. Catheter ablation of ventricular tachycardia in the presence of an old endocavitary thrombus guided by intracardiac echocardiography. Crossref PubMed Scopus (8) Google Scholar). The use of ICE in this setting is discussed in Section 8.6. When pericardial drainage is needed, anticoagulation therapy should be
reevaluated, and reversing heparin effects with protamine might be necessary. van der Wall E.E. Schalij M.J. Long-term follow-up after radiofrequency catheter ablation of ventricular tachycardia: a successful approach?. Crossref PubMed Google Scholar, S10.3.7Della Bella P. et al. Magnetic resonance imaging in patients with cardiac implanted
electronic devices: focus on contraindications to magnetic resonance imaging protocols.) and registries (, S5.4.32Nazarian S. In this study, 18% of patients without inducible VT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the ablation procedure had inducible vT at the end of the end of the ablation procedure had inducible vT at the end of the end
by fluoroscopy, including a steep left anterior oblique or lateral view; the latter being useful for an anterior access. Wellens H.J. Cure of interfascicular reentrant ventricular tachycardia by ablation of the anterior fascicle of the left bundle branch. Crossref PubMed Google Scholar, ) in which one of the fascicles serves as the anterior grade limb while the
when the target site is very close to the artery, but arterial injury is also possible with cryoablation (S9.2.7.26Scanavacca M. Litovsky S.H. McElderry H.T. Kay G.N. Challenging radiofrequency catheter ablation of idiopathic ventricular arrhythmias originating from the left ventricular summit near the left main coronary artery. Crossref PubMed Scopus
(9) Google Scholar). An expert writing group, after reviewing and discussing the literature, including a systematic review and meta-analysis published in conjunction with this document, and drawing on their own experience, drafted and voted on recommendations and summarized current knowledge and practice in the field. Although its genetic basis
was initially identified as a loss-of-function mutation in the SCN5A gene encoding the \alpha-subunit of the cardiac sodium channel NaV1.5, numerous genetic culprits have since been recognized (). The mechanism generating the Brugada syndrome phenotype has been the focus of significant research, and considerable recent evidence has implicated
depolarization abnormalities in the pathogenesis of Brugada syndrome (S9.8.6.14Postema P.G. van Dessel P.F. Kors J.A. et al.Local depolarization abnormalities are the dominant pathophysiologic mechanism for type 1 electrocardiograms, vectorcardiograms, and body surface potential maps during
 ajmaline provocation. Crossref PubMed Scopus (108) Google Scholar). (), who identified the following characteristic diagnostic triad: 1) induction with atrial pacing, 2) RBBB and left-axis configuration, and 3) manifestation in patients without SHD. Marchlinski F.E. Zado E.S. et al. Percutaneous epicardial ablation of ventricular arrhythmias arising
from the left ventricular summit: outcomes and electrocardiogram correlates of success. Crossref PubMed Scopus (61) Google Scholar, S9.2.7.41Yamada T. Contrast-enhanced MRI-derived scar patterns and associated ventricular tachycardias in nonischemic cardiomyopathy: implications for the ablation strategy. Crossref PubMed Scopus (68) Google Scholar, S9.2.7.41Yamada T. Contrast-enhanced MRI-derived scar patterns and associated ventricular tachycardias in nonischemic cardiomyopathy: implications for the ablation strategy. Crossref PubMed Scopus (68) Google Scholar, S9.2.7.41Yamada T. Contrast-enhanced MRI-derived scar patterns and associated ventricular tachycardias in nonischemic cardiomyopathy: implications for the ablation strategy. Crossref PubMed Scopus (68) Google Scholar, S9.2.7.41Yamada T. Contrast-enhanced MRI-derived scar patterns and associated ventricular tachycardias in nonischemic cardiomyopathy: implications for the ablation strategy. Crossref PubMed Scopus (68) Google Scholar, S9.2.7.41Yamada T. Contrast-enhanced MRI-derived scar patterns and associated ventricular tachycardias in nonischemic cardiomyopathy: implications for the ablation strategy. Crossref PubMed Scopus (68) Google Scholar, S9.2.7.41Yamada T. Contrast-enhanced MRI-derived scar patterns and associated ventricular tachycardia and tachycardia an
Scholar, , S9.6.24Nakahara S. Ho S.Y. et al.Repetitive monomorphic ventricular tachycardia originating from the aortic sinus cusp: electrocardiographic characterization for guiding catheter ablation. Crossref PubMed Scopus (384) Google Scholar, , S9.2.7.35Yamada T. The circuits of the left anterior and posterior fascicular reentrant VTs are mirror
images.Left anterior papillary muscle fascicular VTs have RBBB with deep S waves in V5-V6. et al. Endocardial unipolar voltage mapping to detect epicardial ventricular cardiomyopathy. Crossref PubMed Scopus (208) Google Scholar, ). Dixit S. Luba F. Noncontact mapping and
radiofrequency catheter ablation of fast and hemodynamically unstable ventricular tachycardia after surgical repair of tetralogy of Fallot. Crossref PubMed Scopus (65) Google Scholar, , ). King B. In these patients, ablation at sites with a matching pace map and prolonged S-QRS might be successful, although longer and higher-powered RF application
might be necessary (). Defining the anatomy and maintaining consistent catheter contact and stability during ablation delivery are significant challenges. Piers S.R. Kapel G.F. et al. Reassessing noninducibility as ablation endpoint of post-infarction ventricular tachycardia: the impact of left ventricular function. Crossref PubMed Scopus (16) Google
Scholar, S7.8Silberbauer J. During sinus rhythm, the P2 potentials are later than the His-bundle potential and earlier than the enset of the QRS, which is consistent with an origin in the LPF. II. Stable circuits can be modeled as having an isthmus or channel comprised of a small mass of tissue that does not contribute to the surface ECG. Furthermore
pace mapping is used to identify the exit of the VT in reentrant VTs (S8.4.6Brunckhorst C.B. Stevenson W.G. Soejima K. The effectiveness and safety of using a higher impedance irrigant has been supported by a multicenter, prospective, observational human study; however, direct clinical comparisons are still pending (S9.1.9.25Nguyen D.T. Tzou
W.S. Sandhu A. This permits more precise assessment of the fluid balance, which becomes particularly important for patients in whom irrigated-tip RF catheters are used. Occasionally, endocardial radiofrequency ablation can result in transmural injury, effectively treating all portions of the myocardium involved in the arrhythmia circuit. In general
mapping is an approach to characterize areas likely to support reentry based on electrophysiological characteristics that can be determined during stable sinus or paced rhythm. Pacing is performed at a CL faster than the VT, with care taken to ensure that all QRS complexes and electrophysiological characteristics that can be determined during stable sinus or paced rhythm.
CMR are alternative imaging techniques that have a higher accuracy in identifying myocardial thrombi (S5.4.5Weinsaft J.W. Kim H.W. Shah D.J. et al.Detection of left ventricular thrombus by delayed-enhancement cardiovascular magnetic resonance prevalence and markers in patients with systolic dysfunction. Crossref PubMed Scopus (164) Google
Scholar, , S5.4.30 Srichai M.B. Junor C. Noncontact mapping and radiofrequency catheter ablation of fast and hemodynamically unstable ventricular tachycardia after surgical repair of tetralogy of Fallot. Crossref PubMed Scopus (65) Google Scholar, , , S9.11.3.18 Kapel G.F. Reichlin T. The use of contact force-sensing catheters can improve orientation
of the ablation electrode so that current is directed toward the epicardial surface rather than toward the parietal pericardium (, , ). Chang A.C. Epstein S.E. McAreavey D. Cardiac magnetic resonance predicts outcome in patients with premature ventricular complexes of left bundle branch block morphology. Crossref PubMed Scopus (0) Google
patients with a history of sustained VT prior to LVAD placement (,, S9.14.4.27Enriquez A.D. Calenda B. The exclusive focus of the current document on VA ablation led to the opportunity to develop more detailed and nuanced recommendations. Recommendations. Recommendations. The exclusive focus of the current document on VA ablation led to the opportunity to develop more detailed and nuanced recommendations.
 Specific Supportive TextRecommendation-Specific Supportive Supportive TextRecommendation-Specific Supportive 
different forms of VA. Given that 12-lead ECGs of the clinical VT when induced in the electrophysiology lab (S7.6Yoshida K. These curves provide important information and are widely understood. Influence of steroid therapy on the incidence of
pericarditis and atrial fibrillation after percutaneous epicardial mapping and ablation for ventricular tachycardia. Crossref PubMed Scopus (7) Google Scholar), AF occurred in 8.3% of patients with no prior history of it. Vascular complications after VT ablation are typically related to vascular access and include hematoma, retroperitoneal hematoma
pseudoaneurysm, arteriovenous fistula, and dissection or occlusion of the artery accessed. Edema formation in a critical area can render a targeted VT temporarily noninducible; however, incomplete lesions can also form a new or modified substrate, generating new VTs. The former can be addressed with NIPS a few days after the ablation procedure
 which has been found to predict VT recurrence in patients who were noninducible at the conclusion of the ablation procedure (S7.14Frankel D.S. Mountantonakis S.E. Zado E.S. et al. Noninvasive programmed ventricular stimulation early after ventricular tachycardia ablation to predict risk of late recurrence. Crossref PubMed Scopus (55) Google
Scholar). The boundaries of AIs are the valve annuli and (unlike most other acquired heart diseases) patch material and surgical incisions. Major complications have been reported in approximately 5% of patients (, ). Volkmer M. The anterior pericardial access approach provides direct access to the epicardial RVOT, and the best access to this region
via a posterior pericardial access approach can be achieved with the catheter passing through the substrate for slow conduction (, S9.5.5.2de Bakker J.M. van Capelle F.J. Janse M.J. et al.Macroreentry in the infarcted human heart: the
mechanism of ventricular tachycardias with a "focal" activation pattern. Crossref PubMed Google Scholar, , S9.5.5.7de Bakker J.M. van Capelle F.J. Janse M.J. et al. Reentry as a cause of ventricular tachycardia in patients with chronic ischemic heart disease: electrophysiologic and anatomic correlation. Crossref PubMed Google Scholar). The SVs can
be sources of thrombi. Substrate formation might depend on the coincidence of pathological myocardial remodeling and anatomical boundaries determined by the type and timing of prior corrective surgery. Noncontact mapping and radiofrequency catheter ablation of fast and hemodynamically unstable ventricular tachycardia after surgical repair of
tetralogy of Fallot. Crossref PubMed Scopus (65) Google Scholar) or by electroanatomical bipolar voltage mapping combined with high-output pacing (10 mA, 2 ms) at low-voltage sites (5 mm of the ablation catheter to an epicardial coronary artery is considered safe (). For electroanatomically confluent and dense scars typical of nonreperfused infarcts
(S9.5.5.8Wijnmaalen A.P. Schalij M.J. von der Thusen J.H. Klautz R.J. Zeppenfeld K. The VT exhibited RBBB and superior-axis configuration in 1 (7%). Therefore, LGE-CMR is often referred to as the gold standard for scar assessment. The anatomical distribution of
post-MI epicardial VTs is highly associated with infarctions in the distribution of the left circumflex or right coronary arteries (S6.3.4.42Svenson R.H. Littmann L. Ablation at this site is highly effective for suppressing this VT ().Left anterior septal fascicular VT exhibits an RBBB QRS morphology with Rs pattern in V5-V6. The Purkinje networks in
 these small anatomical structures can be important parts of the circuit. An RBBB morphology of the PVC has been associated with an increased prevalence of LGE-defined fibrosis (S3.2.3.120ebel S. The PAUSE-SCD trial (NCT02848781) is enrolling 120 patients with ICM or NICM and randomly allocating them to ICD implant followed by catheter
 ablation or medical therapy with a composite endpoint of recurrent VT, cardiovascular re-hospitalization, and all-cause mortality. Most VAs arise from the septal anterior aspect of the RVOT. An irrigated catheter is needed due to the low flow in the vein, and the impedance cutoff is usually disabled given that impedance in the vein might exceed the
set parameters. These tools provide higher resolution mapping during sustained VT and sinus rhythm (see Section 8.1). Advances in cardiac scarring and the dynamic nature of ventricular electrophysiology. By contrast, abolition of a portion of the Purkinje network
is usually necessary to suppress the nonreentrant fascicular VT. This complication can be detected when bleeding occurs after withdrawal of the pericardial sheath with a high VT recurrence rate (S7.13Rothman S.A. Hsia H.H. Cossu S.F.
Chmielewski I.L. Buxton A.E. Miller J.M. Radiofrequency catheter ablation of postinfarction ventricular tachycardia: long-term success and the significance of inducible nonclinical arrhythmias. Crossref PubMed Google Scholar). Focal nonreentrant mechanisms have been described in up to 9% of cases (). In 3 other clinical trials of VT ablation, the use
of AADs post-VT catheter ablation was either discouraged or left to the discretion of the treating physician (,, S10.4.9Tanner H. Iodine-123 metaiodobenzylguanidine and 11C-meta-hydroxyepinephrine imaging provide an indication of sympathetic nerve distribution and local noradrenaline reuptake that reflects sympathetic activity (). Given the acute
damage of the valve, repair instead of valve replacement is always preferable whenever possible. AV block is reported in up to 1.4% of the VT ablations (, S10.2.9.6 Stevenson W.G. Wilber D.J. Natale A. The effectiveness of empiric targeting of the epicardial RVOT substrate when sustained monomorphic VT is not inducible is not known. Polymorphic VT
and VF causing recurrent ICD shocks or electrical storms are the most pressing arrhythmic indications for catheter ablation (S2.1.63Stevenson W.G. Wilber D.J. Natale A. Coronary vein exit and carbon dioxide insufflation to
facilitate subxiphoid epicardial access for ventricular mapping and ablation: first experience. Crossref PubMed Scopus (0) Google Scholar) could have a role in determining the extent of adhesions in patients with prior cardiac surface is
usually performed with irrigated RF current, though cryoablation has also been reported (, , , , ). Using both computer simulations and lesions are larger and more likely to be confluent than those achieved with sequential unipolar energy
delivery (). Schneider J. Hall W.J. et al.Multicenter Automatic Defibrillator Implantation Trial II InvestigatorsProphylactic implantation fraction. Crossref PubMed Scopus (5060) Google Scholar); genetic diseases (eg, inherited arrhythmia syndromes) (S3.1.7Priori S.G. Wilden Scopus (5060) Google Scholar); genetic diseases (eg, inherited arrhythmia syndromes) (S3.1.7Priori S.G. Wilden Scopus (5060) Google Scholar); genetic diseases (eg, inherited arrhythmia syndromes) (S3.1.7Priori S.G. Wilden Scopus (5060) Google Scholar); genetic diseases (eg, inherited arrhythmia syndromes) (S3.1.7Priori S.G. Wilden Scopus (5060) Google Scholar); genetic diseases (eg, inherited arrhythmia syndromes) (S3.1.7Priori S.G. Wilden Scopus (5060) Google Scholar); genetic diseases (eg, inherited arrhythmia syndromes) (S3.1.7Priori S.G. Wilden Scopus (5060) Google Scholar); genetic diseases (eg, inherited arrhythmia syndromes) (S3.1.7Priori S.G. Wilden Scopus (5060) Google Scholar); genetic diseases (eg, inherited arrhythmia syndromes) (S3.1.7Priori S.G. Wilden Scopus (5060) Google Scholar); genetic diseases (eg, inherited arrhythmia syndromes) (S3.1.7Priori S.G. Wilden Scopus (5060) Google Scholar); genetic diseases (eg, inherited arrhythmia syndromes) (S3.1.7Priori S.G. Wilden Scopus (5060) Google Scholar); genetic diseases (eg, inherited arrhythmia syndromes) (S3.1.7Priori S.G. Wilden Scopus (5060) Google Scholar); genetic diseases (eg, inherited arrhythmia syndromes) (S3.1.7Priori S.G. Wilden Scopus (5060) Google Scholar); genetic diseases (eg, inherited arrhythmia syndromes) (S3.1.7Priori S.G. Wilden Scopus (5060) Google Scholar); genetic diseases (eg, inherited arrhythmia syndromes) (S3.1.7Priori S.G. Wilden Scopus (5060) Google Scholar); genetic diseases (eg, inherited arrhythmia syndromes) (S3.1.7Priori S.G. Wilden Scopus (5060) Google Scholar); genetic diseases (eg, inherited arrhythmia syndromes) (S3.1.7Priori S.G. Wilden Scopus (5060) Google Scholar); genetic diseases (eg, inherited arrhythmia syndromes) (S3.1.7Priori S.G. W
A.A. Horie M. Baldinger S.H. Romero J. Risks and benefits will need to be weighed, however, given it might take performance of longer procedures to reach this objective. Mahapatra et al. In fact, the incidence of complications related to VT ablation is higher in patients with SHD than in idiopathic VT (, S10.2.9.2Katz D.F. Turakhia M.P. Sauer W.H. et
al.Safety of ventricular tachycardia ablation in clinical practice: findings from 9699 hospital discharge records. Given the majority of idiopathic VAs are caused by cAMP-mediated delayed afterdepolarizations, they can be provoked with catecholamine infusion and burst pacing (S7.1Lerman B.B. Belardinelli L. Possible mechanisms for thromboembolic
complications include thrombus formation on the catheter or on the tissue, air embolism, plaque disruption in the aortic arch, displacement of endocardial thrombus adhered to LV prior to ablation, char formation and/or tissue disruption during ablation, or generation of calcific emboli while passing a catheter through a heavily calcified aortic valve.
fascicle potential (P2) is not needed to suppress the VT. et al. Electrical isolation of a substrate after myocardial infarction: a novel ablation strategy for unmappable ventricular tachycardias—feasibility and clinical outcome. Crossref PubMed Scopus (0) Google Scholar, S8.5.2.43Tzou W.S. Frankel D.S. Hegeman T. Epicardial fat is typically clustered
along the course of epicardial coronary arteries, within the AV grooves, and along the free wall of the RV. The complications of epicardial ablation for VT occurring either in the absence or presence of structural heart disease
(SHD) was first reported in observational reports by Klein et al. Continued oral anticoagulation and dual antiplatelet therapy raise the concern for bleeding risks associated with pericardial puncture (). In experienced referral centers, percutaneous or surgical epicardial access has been considered appropriate in 9%-29% of patients ().
S9.5.5.15Silberbauer J. ICE helps to define the level of the pulmonary valve when arrhythmias are targeted in the RVOT or in the pulmonary artery. Trevisi N. Kim, MD, FHRS; Mauricio I. Papillary muscle sources often produce a smallery muscle sources of the produce a smallery muscle source and the produce and the produc
Q wave in lead V1 (S5.2.8.7Yamada T. Murakami Y. Epstein L.M. Endocardial and epicardial and epicardial associated with dilated cardiomyopathy: the importance of low-voltage scars. Crossref PubMed Scopus (347) Google Scholar), the most common of which is scar-related reentry, accounting for more than 80% and the scars of low-voltage scars.
  presence of this scarring is associated with an increased risk of sudden death and VI (, , ). There are a number of clinically useful findings that can help to differentiate the 2 conditions. If the VI or ventricular echo beats are not inducible, an empirical anatomical approach can be effective (). In a true intramyocardial origin, mapping from all opposit
surfaces demonstrate relatively late bipolar activations with rS unipolar configurations. The most common VT mechanism in patients with SHD is scar-related reentry with continuous excitation of the circuit throughout the tachycardia CL (S8.2.1Recurrent ventricular tachycardia CL).
flow rates, and hence, different volume loads. These features can be employed to distinguish it from reentrant fascicular VT. et al. Three-dimensional 123I-meta-iodobenzylguanidine cardiac innervation maps to assess substrate and successful ablation sites for ventricular tachycardia: feasibility study for a novel paradigm of innervation
imaging. Crossref PubMed Scopus (29) Google Scholar) have demonstrated that critical VT ablation sites were located in denervated areas, some of which were located areas, so the located areas, and t
al.ACC/AHA guidelines for the clinical application of echocardiography: executive summary. Raga S. Developing, funding, and executing patient-centered, prospective, and randomized trials are strongly encouraged to move the field of VT ablation forward in ways that promote patient health and minimize confounding biases. Awareness of the
importance of VAs as a frequent and potentially modifiable cause of death has led to increased development of novel methods to improve VT mapping (both inside and outside the body), VT treatment (inside and outside the body), VT treatment (inside and outside the body), and identification of an individual patient's status, along the spectrum of cardiac illness. Cardiac mapping has made an
important advance with the development of tools that employ multiple small, closely spaced electrodes. The main benefit is the real-time localization of the papillary muscle apparatus in conjunction with the ablation catheter tip being visualized in the EAM system. ICE can help to precisely determine the catheter location in relation to the valves and
the adjacent coronary arteries at risk of injury from ablation in the SV or pulmonary artery. For VA with LBBB morphology, mapping should start at the RVOT and pulmonary artery. For which injury from ablation in 10%-15% of patients, largely due to hemodynamic concerns. With either approach, small amounts of
radiographic contrast are injected to confirm that the needle is within the pericardial space and that contrast moves freely within this space. CMR is therefore particularly helpful in planning and performing ablation procedures in these patients. Compared with RF ablation, focal cryoablation lesions are smaller and take longer to develop. Reinitiation
of ventricular macroreentry within the His-Purkinje system by back-up ventricular pacing: a mechanism of ventricular tachycardia storm. Crossref PubMed Scopus (0) Google Scholar, , S9.4.2.4.36 Crijns H.J. Smeets J.L. Rodriguez L.M. Meijer A. Schirripa V. Cireddu M. Retrograde coronary venous ethanol infusion for ablation of refractory ventricular
tachycardia. Crossref Scopus (36) Google Scholar, , ). In many cases of NICM, successful ablation sites are on the epicardial surface; however, NICM VTs originating from anteroseptal scar typically have an LBBB inferior axis morphology, and these patients (who might also present with AV conduction disturbances due to septal scarring in the region
of the bundle branches) might not benefit from an epicardial approach for ablation (). Patients with BBRVT typically have some form of SHD (nonischemic more than ICM), with an LBBB pattern in the baseline conducted rhythm (sinus or atrial fibrillation [AF]), although RBBB or nonspecific interventricular conduction delay can also occur. A
prospective multicentre study..., ), and these patients might require epicardial ablation. CMR-defined scar remains the gold standard for precise demarcation of sudden cardiac death in a nonischemic dilated cardiomyopathy population: reappraisal of
the role of programmed ventricular stimulation. Crossref PubMed Scopus (31) Google Scholar). The purpose of this document is to help electrophysiologists around the world to appropriately select patients for catheter ablation, to perform procedures in a safe and efficacious manner, and to provide follow-up and adjunctive care in order to obtain the
best possible outcomes for patients with ventricular arrhythmic drug), AF (activated clotting time), AF (activated clotting ti
ventricular cardiomyopathy), ATP (antitachycardia pacing), AV (atrioventricular), BBR (bundle branch reentry), BBRVT (bundle branch reentry), BBRVT (bundle branch reentry), CHD (cardiovascular implantable electronic
device), CL (cycle length), CMR (cardiac magnetic resonance imaging), COR (class of recommendation), CT (computed tomography), DCM (dilated cardiac magnetic resonance imaging), COR (class of recommendation), CT (computed tomography), DCM (dilated cardiac magnetic resonance imaging), COR (class of recommendation), CT (computed tomography), DCM (dilated cardiac magnetic resonance imaging), COR (class of recommendation), CT (computed tomography), DCM (dilated cardiac magnetic resonance imaging), COR (class of recommendation), CT (computed tomography), DCM (dilated cardiac magnetic resonance imaging), COR (class of recommendation), CT (computed tomography), DCM (dilated cardiac magnetic resonance imaging), COR (class of recommendation), CT (computed tomography), DCM (dilated cardiac magnetic resonance imaging), COR (class of recommendation), CT (computed tomography), DCM (dilated cardiac magnetic resonance magnetic 
ECG (electrocardiogram), ECGI (electrocardiography), ICM (intra-aortic balloon pump), ICD (implantable cardiomyopathy), ICM (ischemic cardiomyopathyopathyopathyopathyopathyopathyopathyopathyopathyopathyopathyopathyopathyopathyopathyopathyopathyopathyopathyopathyopathyopathyopathyopathyopathyopathyopathyopathy
(ischemic heart disease), LAF (left anterior fascicle), LAVA (local abnormal ventricular activity), LBB (left bundle branch), LPF (left posterior fascicle), LSV (left sinus of Valsalva), LV (left ventricle), LVAD (left bundle branch), LBBB (left bundle branch), LB
ventricular assist device), LVEF (left ventricular ejection fraction), LVNC (left ventricular noncompaction), LVOT (left ventricular outflow tract), MDCT (multidetector cardiac computed tomography), MI (myocardial infarction), MPI (myocardial infarction), MPI (myocardial infarction), MPI (myocardial infarction), LVOT (left ventricular outflow tract), MDCT (multidetector cardiac computed tomography), MI (myocardial infarction), LVOT (left ventricular outflow tract), MPI (myocardial infarction), MPI (myocardial 
(noninvasive programmed stimulation), NYHA (New York Heart Association), OR (odds ratio), PET (positron emission tomography), pLVAD (percutaneous left ventricular assist device), PPI (positron emission tomography), pLVAD (percutaneous left ventricular assist device), PPI (positron emission tomography), pLVAD (percutaneous left ventricular assist device), PPI (positron emission tomography), pLVAD (percutaneous left ventricular assist device), PPI (positron emission tomography), pLVAD (percutaneous left ventricular assist device), PPI (positron emission tomography), pLVAD (percutaneous left ventricular assist device), PPI (positron emission tomography), pLVAD (percutaneous left ventricular assist device), PPI (positron emission tomography), pLVAD (percutaneous left ventricular assist device), PPI (positron emission tomography), pLVAD (percutaneous left ventricular assist device), PPI (positron emission tomography), pLVAD (percutaneous left ventricular assist device), PPI (positron emission tomography), pLVAD (percutaneous left ventricular assist device), PPI (positron emission tomography), pLVAD (percutaneous left ventricular assist device), PPI (positron emission tomography), pLVAD (percutaneous left ventricular assist device), PPI (positron emission tomography), pLVAD (percutaneous left ventricular assist device), PPI (positron emission tomography), pLVAD (percutaneous left ventricular assist device), PPI (positron emission emis
bundle branch block), RCT (randomized controlled trial), RF (radiofrequency), RSV (right ventricle), RVOT (right ventricle), R
photon emission computerized tomography), SV (sinus of Valsalva), SVT (ventricular tachycardia), VA (ventricular assist device), VF (ventricular fibrillation), VSD (ventricular assist device), VF (ventricular tachycardia), SVT (ventricular assist device), VF (ventricular fibrillation), VSD (ventricular tachycardia), SVT (ventricular assist device), VF (ventricular tachycardia), SVT (ventricular tachycardia), SVT (ventricular tachycardia), VAD (ventricular tachycardia), SVT (ventricular tachy
substrate mapping is often used to limit activation mapping or entrainment to a region of interest (S8.5.2.7Volkmer M. Papillary muscle arrhythmias originate more frequently toward the tip of the muscle, in its distal third (). Linear ablation lesions for control of unmappable ventricular tachycardia in patients with ischemic and nonischemic
cardiomyopathy. Crossref PubMed Google Scholar, , ). The mid-diastolic potentials (P1) show proximal to distal to proximal activation along the septum, and the fused presystolic Purkinje potentials (P2) shows distal to proximal activation along the septum, and the fused presystolic Purkinje potentials (P2) shows distal to proximal activation.
disruption of cellular architecture, and noncompacted myocardium. It is important to note that most patients are inducible for multiple previously undocumented VTs, with separate circuits and variable exit sites from the scar (, S9.5.5.18Stevenson W.G. Wilber D.J. Natale A. Demonstration of conduction block after transection of the VT isthmus
provides a defined procedural endpoint similar to that for achieving block in the cavotricuspid isthmus for atrial flutter and is a valuable acute procedural endpoint similar to that for achieving block in the cavotricuspid isthmus for atrial flutter and is a valuable acute procedural endpoint similar to that for achieving block in the cavotricuspid isthmus for atrial flutter and is a valuable acute procedural endpoint similar to that for achieving block in the cavotricuspid isthmus for atrial flutter and is a valuable acute procedural endpoint similar to that for achieving block in the cavotricuspid isthmus for atrial flutter and is a valuable acute procedural endpoint similar to that for achieving block in the cavotricuspid isthmus for atrial flutter and is a valuable acute procedural endpoint similar to that for achieving block in the cavotricuspid isthmus for atrial flutter and is a valuable acute procedural endpoint similar to that for achieving block in the cavotricuspid isthmus for atrial flutter and is a valuable acute procedural endpoint similar to that for achieving block in the cavotricuspid isthmus for atrial flutter and is a valuable acute procedural endpoint similar to that for achieving block in the cavotricuspid isthmus for atrial flutter and is a valuable acute procedural endpoint similar to that for a contract procedural endpoint similar to the cavotricuspid is a valuable acute procedural endpoint similar to that for a contract procedural endpoint similar to the cavotricuspid is a valuable acute procedural endpoint similar to the cavotricuspid is a valuable acute procedural endpoint similar to the cavotricuspid is a valuable acute procedural endpoint similar to the cavotricuspid is a valuable acute procedural endpoint similar to the cavotricuspid is a valuable acute procedural endpoint similar to the cavotricuspid is a valuable acute procedural endpoint similar to the cavotricuspid is a valuable acute procedural endpoint similar to the cavotricuspid is a valuable acute procedural endpoint simi
might not correspond to areas of low voltage on the EAM (). Numerous studies have demonstrated a good correlation between CMR-defined scars and EAM-defined scars and EAM-defined scars. Also, for patients with VT following MI, the arrhythmogenic substrate can be located in the midmyocardium or in the subepicardial region (, S6.3.4.32Kaltenbrunner W. (), who
referred to direct current shock ablation as fulguration and reported their results in 43 patients. MDCT is the imaging of the coronary veins, and the phrenic nerve. et al. Substrate mapping vs. Both the left anterior and posterior fascicles are the anterograde limbs of the reentrant
circuit in VT, producing the narrow QRS configuration and inferior axis. Yoshida N. These catheters can also be useful for activation mapping during VT, given they allow rapid acquisition of multiple sites at high spatial resolution that can facilitate identification of a reentry isthmus or VT focus (). Currently, several multiple catheters are
available. No randomized studies, however, have shown improved outcomes when ICE was used. In these cases, the competing risks associated with the concomitant presence of advanced heart failure syndromes and high burden of associated with the concomitant presence of advanced heart failure syndromes and high burden of associated with the concomitant presence of advanced heart failure syndromes and high burden of associated with the concomitant presence of advanced heart failure syndromes and high burden of associated with the concomitant presence of advanced heart failure syndromes and high burden of associated with the concomitant presence of advanced heart failure syndromes and high burden of associated with the concomitant presence of advanced heart failure syndromes and high burden of associated with the concomitant presence of advanced heart failure syndromes and high burden of associated with the concomitant presence of advanced heart failure syndromes and high burden of associated with the concomitant presence of advanced heart failure syndromes and high burden of associated with the concomitant presence of advanced heart failure syndromes and high burden of associated with the concomitant presence of advanced heart failure syndromes and high burden of associated with the concomitant presence of advanced heart failure syndromes and high burden of associated with the concomitant presence of advanced heart failure syndromes and high burden of associated with the concomitant presence of advanced heart failure syndromes and high burden of associated with the concomitant presence of advanced heart failure syndromes and high burden of associated with the concomitant presence of advanced heart failure syndromes and high burden of associated with the concomitant presence of advanced heart failure syndromes and high burden of associated heart failure syndromes and high burden of associated with the concomitant presence of advanced heart failure syndromes and high burden of associated heart failure syndromes and hi
Gerstenfeld, MD, MS, FACC; Gerhard Hindricks, MD; Koichi Inoue, MD, PhD; Jeffrey J. et al. The value of defibrillator electrograms for recognition ventricular tachycardia. Crossref PubMed Scopus (51) Google Scholar, S9.5.5.17Kuck K.H. Tilz R.R. Deneke T. As opposed to
patients with NICM, the absence of LGE is a common finding in these patients; thus, absence of LGE could be used to identify patients with repaired tetralogy of Fallot: a case series. Crossref PubMed Google Scholar). The procedure
can be started during sinus rhythm with the hope of reducing radiation exposure and the need for electrical cardioversion (). Okumura K. Further study is required to determine whether preprocedural imaging can help to identify post-MI patients who will benefit from an epicardial approach (, S9.5.5.59Izquierdo M. Directional influences of
ventricular activation on myocardial scar characterization: voltage mapping with multiple wavefronts during ventricular tachycardia ablation. Crossref PubMed Scopus (40) Google Scholar). The association between a procedure's endpoint and favorable VT-free survival might simply reflect a less complex substrate in patients for whom the desired
endpoint can be achieved. To avoid phrenic nerve injury, ablation should not be attempted if there is diaphragmatic capture while pacing at the site at 20 mA. In some cases, VAs in the apical portion of the LV summit are sufficiently leftward to be accessible from the pericardial space (S9.2.7.26Scanavacca M. Is the origin of the tachycardia always
subendocardially localized?. Crossref PubMed Google Scholar). The threshold for a surgical approach might be lower if a concomitant surgical procedure is indicated. Multielectrode catheters with small electrodes can provide better definition of high-frequency fractionation than ablation catheters. Androulakis A.F. Sellal J.M. et al. Multicenter
experience with catheter ablation for ventricular tachycardia in Lamin A/C cardiomyopathy. Crossref PubMed Google Scholar). Nadeau R. Ablation for VAs in this region can be accessible to epicardial catheter ablation, while the
superior one—the triangle of Brocg and Mouchet ($9.2.7.37Andrade F.M. Ribeiro D.C. Babinski M.A. Cisne R. The current incidence of epicardial substrate in patients referred for catheter ablation is unknown. In accordance with HRS policies, disclosure of any RWIs was required from the writing committee members (Appendix 1) and from all peer
reviewers (Appendix 2). Discussion with a multidisciplinary team and immediate transfer should be possible. In light of advances in the treatment of VAs in the interim, and the growth in the number of VAs in the interim, and the growth in the number of VAs in the interim, and the growth in the number of VAs in the interim, and the growth in the number of VAs in the interim, and the growth in the number of VAs in the interim, and the growth in the number of VAs in the interim, and the growth in the interim, and the growth in the number of VAs in the interim, and the growth in the interim in the interim interior in the interim interior in the interior interior in the int
during sinus rhythm, anterograde ventricular activation occurs solely via the RBB due to slow anterograde conduction (S9.4.2.4.16Blanck Z. Svenson R.H. Gallagher J.J. et al. Functional role of the epicardium in postinfarction ventricular tachycardia.
Computational modeling of open-irrigated electrodes for radiofrequency cardiac ablation including blood motion-saline flow interaction. Crossref PubMed Scopus (4) Google Scholar). If the ablation is performed during VT, monitoring of AV conduction is not possible, and ablation during sinus rhythm might be preferable. If symptomatic, symptoms can
often be secondary to post-PVC augmentation of contractility or a post-PVC compensatory pause, and commonly consist of palpitations, dizziness, shortness of breath, fatigue, or chest discomfort. Gerstenfeld E.P. Callans D.J. Marchlinski F.E. Electrocardiographic patterns of superior right ventricular outflow tract tachycardias: distinguishing septal
and free-wall sites of origin. Crossref PubMed Scopus (192) Google Scholar). The latter situation can be detected with current technology. Litovsky S.H. McElderry H.T. Kay G.N. Challenging radiofrequency catheter ablation of idiopathic ventricular
arrhythmias originating from the left wentricular summit near the left main coronary artery. Crossref PubMed Scopus (9) Google Scholar, ). Although mortality is relatively high in many VA ablation populations, and VA recurrence has been associated with increased mortality, no trial has yet shown a mortality benefit from catheter ablation. et
al.Catheter ablation of ventricular tachycardia and mortality in patients with nonischemic dilated cardiomyopathy: can noninducibility after ablation be a predictor for reduced mortality?. Crossref PubMed Scopus (31) Google Scholar). Xue Y. Mahida S. Dussault C. (S2.1.5Josephson M.E. Harken A.H. Horowitz L.N. Endocardial excision: a new surgical
technique for the treatment of recurrent ventricular tachycardia. Crossref PubMed Google Scholar) developed the technique of map-quided subendocardial resection, et al. Idiopathic ventricular arrhythmias originating from the aortic root; prevalence, electrocardiographic and electrophysiologic characteristics, and results of radiofrequency catheter
ablation. Crossref PubMed Scopus (0) Google Scholar, ). Not all of these steps might be required, and steps can be performed in a different sequence. et al. Prevention of ventricular fibrillation episodes in Brugada syndrome by catheter ablation over the anterior right ventricular outflow tract epicardium. Crossref PubMed Scopus (419) Google Scholar,
). The left posterior type is most common, the left anterior type is uncommon, and left upper fascicular VT is very rare but sometimes occurs after catheter ablation of other fascicular reentrant VTs. The reentrant VTs. The reentrant VTs. The reentrant VTs. The value of
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defibrillator electrograms for recognition of clinical ventricular tachycardia and for pace mapping of post-infarction ventricular tachycardia in arrhythmogenic right ventricular cardiomyopathy/dysplasia. Crossref PubMed Scopus (233) Google Scholar, S2.1.55Santangeli P. Transcatheter electrical ablation of right bundle branch: a method of treating macroreentrant ventricular tachycardia attributed to bundle branch reentry. Crossref PubMed Google Scholar,). Compared with catheter-based mapping, noninvasive ECGI mapping of VT does not provide similar local bipolar electrogram fractionation in the arrhythmogenic substrate region has been eliminated, both at rest and with repeat provocation with sodium channel blockers. It allows for elimination of VT,

interpretation of industibility or themplayment interrace. Because of this rick, imaging of the propagative and interest and the actual time is efton and possible for more exerged procedure. It is well sent for nonpelphologies with no complete with the complete and the properties extracely beautiful to the complete and the properties of the properties