The Role of Catheter Ablation in the Management of Ventricular Tachycardia

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Disclosures

Consultant and/or Honoraria:

Daiichi Sankyo
Boehringer - ingelheim
Atricure
Medtronic
St Jude Medical
Goals

• Historical Perspective on VT Ablation
• Technique and Role of Catheter ablation for Treatment of Idiopathic VT
• Technique and Role of Catheter Ablation for Treatment of VT in Patients with Structural Heart Disease
• Current Status of Multicenter Clinical Trials of VT Ablation
• Conclusion and Final Thoughts
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Surgical Treatment of Ventricular Tachycardia

- First reported in the mid 1970’s
- Guiraudon; “encircling endocardial ventriculotomy”
- Josephson, Harken; “endocardial excision”
Surgical Treatment of Ventricular Tachycardia
### SURGICAL/ABLATIVE THERAPY

<table>
<thead>
<tr>
<th>Author</th>
<th>Institution</th>
<th>Year</th>
<th># Pts</th>
<th>Operative Mortality</th>
<th>% NI</th>
<th>Recurrence Rate*</th>
<th>Follow-up Duration</th>
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<tbody>
<tr>
<td>Josephson</td>
<td>Penn</td>
<td>1982</td>
<td>60</td>
<td>8%</td>
<td>76</td>
<td>5%</td>
<td>19 ± 11</td>
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<tr>
<td>Miller</td>
<td>Penn</td>
<td>1984</td>
<td>100</td>
<td>9%</td>
<td>72</td>
<td>9%</td>
<td>28 ± 19</td>
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<td>Keho</td>
<td>N.W.</td>
<td>1985</td>
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<td>13%</td>
<td>77</td>
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<tr>
<td>Platia</td>
<td>Hopkins</td>
<td>1986</td>
<td>28</td>
<td>11%</td>
<td>80</td>
<td>10%</td>
<td>25</td>
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<tr>
<td>Krafeck</td>
<td>Baylor</td>
<td>1986</td>
<td>39</td>
<td>10%</td>
<td>97</td>
<td>9%</td>
<td>22 ± 17</td>
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<tr>
<td>Garan</td>
<td>MGH</td>
<td>1986</td>
<td>36</td>
<td>17%</td>
<td>66</td>
<td></td>
<td>25 ± 15</td>
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<td>Swerdlow</td>
<td>Stanford</td>
<td>1986</td>
<td>98</td>
<td>16%</td>
<td>68</td>
<td>20%</td>
<td>23 ± 21</td>
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<tr>
<td>Ostermeyer</td>
<td>Dusseldorf</td>
<td>1987</td>
<td>93</td>
<td>5%</td>
<td>81</td>
<td>10%</td>
<td>26</td>
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<tr>
<td>Haines</td>
<td>UVA</td>
<td>1988</td>
<td>45</td>
<td>9%</td>
<td>85</td>
<td>11%</td>
<td>19 ± 12</td>
</tr>
</tbody>
</table>

* of patients that are NI
Catheter Ablation Using DC Shock Energy
3 patients underwent DC shock ablation
1 – idiopathic RVOT VT
2 – recurrent VT after failed aneurysmectomy
The Era of RF Ablation: 1989 - present
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Idiopathic Ventricular Tachycardia
Outcomes of Catheter Ablation of Idiopathic Ventricular Tachycardia

- **Acute Efficacy**: > 90%
- **Long Term Efficacy / Cure**: ≥ 85%
- **Major Complications**: < 1%
- **Clinical Role**: First line
Catheter ablation of VT is recommended for patients with idiopathic VT
1. for monomorphic VT that is causing severe symptoms.
2. for monomorphic VT when antiarrhythmic drugs are not effective, not tolerated, or not desired.
3. for recurrent sustained polymorphic VT and VF (electrical storm) that is refractory to antiarrhythmic therapy when there is a suspected trigger that can be targeted for ablation.

Catheter ablation is recommended for patients with frequent PVCs or NSVTs when they are presumed to cause ventricular dysfunction. At the time of the ablation procedure, the patient is sedated and the procedure is performed under general anesthesia.
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Catheter Ablation Ventricular Tachycardia in Patients with Structural Heart Disease
Outcomes of Catheter Ablation of Ventricular Tachycardia in Patients with Structural Heart Disease

- Acute Success: 50 – 80%
- Longer Term Efficacy (with AA drugs): 50%
- Major Complications: 5-15%
- Clinical Role: Second line
Catheter Ablation of Ventricular Tachycardia in Patients With Structural Heart Disease Using Cooled Radiofrequency Energy
Results of a Prospective Multicenter Study
Hugh Calkins, MD, FACC, Andrew Epstein, MD, FACC, Douglas Packer, MD, FACC, Amelia M. Arria, PriD, John Hummel, MD, FACC, David M. Gilligan, MD, FACC, Janet Trusso, RN, Mark Carlson, MD, FACC, Richard Luceri, MD, FACC, Harry Kopelman, MD, FACC, David Wilber, MD, FACC, J. Marcus Wharton, MD, FACC, William Stevenson, MD, FACC, for the Cooled RF Multi Center Investigators Group
Baltimore, Maryland

146 pts, SHD (IHD 82%), 65 ± 12 yrs, EF 31 ± 13%
Irrigated RF ablation
3 VTs per patient
Acute success in 75% mappable, 41% all VTs
Major compl: 8% (death in 2.7%)
Amiodarone at discharge in 42%
46% recurrence rate during 243 + 153 d fu
25% mortality at one year follow-up
231 pts, IHD, 68 yrs, EF 25 
Irrigated RF ablation
3 VTs per patient
Acute success in 49%
Major compl:
Major complications 10.3
Death within 7 days -7 pts (3%)
AA drugs at last fu in 72%
47% recurrence rate at 6 m fu
18% 1 year mortality
Catheter Ablation of Recurrent Scar-Related Ventricular Tachycardia Using Electroanatomical Mapping and Irrigated Ablation Technology: Results of the Prospective Multicenter Euro-VT-Study

HILDEGARD TANNER, M.D.,* GERHARD HINDRICKS, M.D.,* MARIUS VOLKMER, M.D.,† STEVE FURNISS, M.D.,‡ VOLKER KÜHLKAMP, M.D.,§ DOMINIQUE LACROIX, M.D., Ph.D.,¶ CHRISTIAN DE CHILLOU, M.D., Ph.D.,# JESÚS ALMENDRAL, M.D., Ph.D.,** DOMENICO CAPONI, M.D.,†† KARL-HEINZ KUCK, M.D.,† and HANS KOTTKAMP, M.D.*

63 pts, IHD, 64 ± 9 yrs, EF 30 ± 13%
Irrigated RF ablation
3 VTs per patient
Acute success in 81%
Major compl: 1.5%
Amiodarone in 65%
49% recurrence rate during 12 + 3 m fu

Cum. Freedom from any VT

Follow-up, months

No at risk: 63 45 38 37 34 31 30 29 28 27 26

JCVEP 2010
Patients with structural heart disease (including prior MI, dilated cardiomyopathy, ARVC/D)

Catheter ablation of VT is recommended
1. for symptomatic sustained monomorphic VT (SMVT), including VT terminated by an ICD, that recurs despite antiarrhythmic drug therapy or when antiarrhythmic drugs are not tolerated or not desired;*
2. for control of incessant SMVT or VT storm that is not due to a transient reversible cause;
3. for patients with frequent PVCs, NSVTs, or VT that is presumed to cause ventricular dysfunction;
4. for bundle branch reentrant or interfascicular VTs;
5. for recurrent sustained polymorphic VT and VF that is refractory to antiarrhythmic therapy when there is a suspected trigger that can be targeted for ablation.

Catheter ablation should be considered
1. in patients who have one or more episodes of SMVT despite therapy with one of more Class I or III antiarrhythmic drugs;*
2. in patients with recurrent SMVT due to prior MI who have LV ejection fraction >0.30 and expectation for 1 year of survival, and is an acceptable alternative to amiodarone therapy;*
3. in patients with haemodynamically tolerated SMVT due to prior MI who have reasonably preserved LV ejection fraction (>0.35) even if they have not failed antiarrhythmic drug therapy.*
Ongoing Multicenter Trials of VT Ablation - Current Status -

- Mantra VT: IHD VT randomized to abl or AA drugs
- Star VT - clin or induc VT undergoing ICD implant, IHD and NIHD, Abl vs drugs
- Aspire VT – IHD VT randomized to early VT abl & drugs verus drugs – closed due to poor enrollment
- Vanish - VT abl in IHD pts with VT despite AA drugs randomized to more AA drugs or CA and drugs – enrollment complete
Ongoing Multicenter Trials of VT Ablation
- Current Status -

• Mantra VT: IHD VT randomized to abl or AA drugs

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  randomized to more AA drugs or CA and drugs –
  enrollment complete
Logistical Challenges that Impair VT Ablation

- Patients present at inconvenient times
- Procedure rooms are full due to the success of AF ablation!
- The numbers of patients are relatively small
- The days of VT arising from large aneurysms are over
- The substrates and extent of disease differ markedly
- Multiple mechanisms for VT often exist (i.e. ischemia)
- VT ablation is technically challenging
- The lesions we can create with RF energy may not be large enough.
- Cases are long
- Risks are high
- Not a money maker
- Amiodarone is widely available
Summary and Conclusion

Catheter ablation of idiopathic VT is a safe, effective, and curative procedure.

Catheter ablation of VT in the setting of structural heart disease is challenging. This is a complex procedure associated with moderate efficacy despite continued AA AA drug therapy in most patients, and a significant incidence of complications including mortality.

Despite these challenges, this procedure plays an Important role in patient management and represents the true “frontier” of catheter ablation in 2015.
Thank You