Mapping and Ablation of Challenging Outflow Tract VTs: Pulmonary Artery, LVOT, Epicardial

Samuel J. Asirvatham, MD
Mayo Clinic Rochester
California Heart Rhythm Symposium
San Francisco, CA
September 8, 2012 – 1:45 PM

Disclosures
I receive royalties for work licensed through Mayo Clinic to a privately held company for contributions related to the use of nerve signal modulation to treat central, autonomic, and peripheral nervous system disorders, including pain. Mayo Clinic receives royalties and owns equity in this company. The company does not currently license or manufacture any drug or device in the medical field.

Co-patent holder for technique to minimize coagulum formation during radiofrequency ablation

Products or techniques related to the above disclosures are not being discussed in this presentation.

Pertains to inventions/startup companies that include Nevro, Aegis, and the Phoenix Corp.

VT Ablation

Less difficult
Outflow tract
LV
ARVD
Valvar

More difficult
Fascicular
Purkinje
Reentry
Anatomic target
Mitrval valve
Scars
System
Have to map

Imaging
Lesion creation
Electrophysiology
Anatomy

Right Ventricular Outflow Tract VT

-I
aVR
V1
V4
-II
aVL
V2
V5
-III
aVF
V3
V6
Right Ventricular Outflow Tract VT (RVOT VT)

- Left bundle branch block, inferior axis
- Typically exercise provoked
- May be sustained or in salvos
- Prognosis generally excellent
- Some are sensitive to beta blockers or Ca channel blockers
- Mapping based on earliest activation

26 yrs female, 25,000 PVCs on Holter 3 failed ablations

3 Steps to Non Contact Map

1. Define Geometry
2. Record Map
3. Guide catheter to critical map site
Cardiac Vein
LVOT retrograde approach

Normal Heart
Direction of Great Arteries
- Pulmonary artery
  Anterior to aorta
  To left shoulder
- Ascending aorta
  Posterior to PA
  To right shoulder
- Aorta-PA angle
  60 to 90 degrees

Anterior View

Normal Heart
Ventricles

Long-Axis View

RVOT
LVOT
LCX
LAD
RV
LA
LV
Ao
PA
LV
LA

Aortic-PA angle
60 to 90 degrees

RVOT
LVOT
LCX
LAD
RV
LA
LV
Ao
PA
LV
LA

Aortic-PA angle
60 to 90 degrees
Inlet-outlet ring around

Right AV junction and Outflow tracts
Left AV junction
Dead-end tract
Trabecular component of right ventricle
Left ventricle
Ventricular bundle branches on apical trabecular septum
Primary septum
Penetrating bundle
Dead-end tract
AV groove
Right ventricle
AV groove
Branching bundle and bundle branches

12-lead ECG
RVOT Anatomy

Lasso at aortic Sinus of Valsava

Normal Heart
External Topography

Superior View

Figure 1A

Imaging and Epicardial Procedures

Left Ventricle, Epicardium, Acetone, LabVision (Kit)

Pacemaker unit

Slow waves in ICC

Slow waves in circular muscle
External Cardiac Anatomy
Pericardium

Illustration (CIBA)  Heart Removed

VT in the “Normal Heart”
1. Right ventricular dysplasia
2. Sarcoidosis
3. Cardiomyopathy, not tachycardia related
4. Coronary vascular malformation
5. Mitral valve prolapse
6. False tendon/moderator band
7. Non-compact myocardium
8. Atypical ventricular dysplasia pattern
Ventricular Tachycardia Ablation in the “Normal” Heart

- Outflow tract VT
  - Appreciating the relative anatomy
  - Clinical arrhythmia syndromes
  - Causes of difficulty with ablation
- Cuspal tachycardias
  - VT
  - Atrial arrhythmias
  - Accessories pathways
- Investigating potential structural causes
  - Dysplasia
  - Coronary malformations
  - Remnant fascicles

Mapping and Ablation of Challenging Outflow Tract VTs: Pulmonary Artery, LVOT, Epicardial

Samuel J. Asirvatham, MD
Mayo Clinic Rochester
California Heart Rhythm Symposium
San Francisco, CA
September 8, 2012 – 1:45 PM