Emerging Technologies in the Cath & EP Labs

EP Labs

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Disclosures

Consultant / Speaker / Advisor

- Biosense Webster
- Abbott
- Stereotaxis

No Investigational Technologies
Electrophysiology Center

Electrophysiology

- EPS
- Ablation
- Cardioversion
- EP Clinics
- Genetics Clinic
- Telemetry – Outpatient
- Research / Clinical Trials

Pacing

- Device Implants
- Device Clinics
- Lead Management Extraction Program
- Clinical Trials

New Programs
- LAA Occlusion
- VT / VF – ICU

EP Fellowship Program
Subcutaneous Event Monitor
1.5T and 3T Full Body MRI Scanning

No restrictions on

- Scan duration
- Number of scans
- R-wave amplitude
- Pacemaker dependency
LV Lead Location Matters For Better CRT Outcomes
Subcutaneous ICD
Technologies
Arrhythmia Mapping and Ablation
Atrial Fibrillation
Non-Pharmacologic Management

Catheter Ablation for Rhythm Control
The 2014 AHA/ACC/HRS Guidelines for Afib Management provide the highest level of recommendation (Class: 1; Level of Evidence: A) for catheter ablation as treatment for drug-refractory, symptomatic paroxysmal Afib.

Timeline

Rate vs. Rhythm Control

AFFIRM Study
No survival advantage of Rate vs. Rhythm control

DIAMOND Study
NSR leads to significant reduction in mortality

Corley (AFFIRM sub-analysis)
NSR associated with 47% reduction on risk of death

Wilber
RFCA is superior in efficacy and safety to AAD

Ionescu
Mortality among patients on rhythm control gradually decreased relative to rate control

Ghanbari
NSR after RFCA is associated with 60% reduction in CV mortality

2001
Class III
Level C

2002

2003

2004

2006

2010

2012

2014

2001

2002

2003

2004

2006

2010

2012

2014

Class II
Level B

Class I
Level A*

Society Guidelines for Afib Ablation

*Class I Level A for PAF with no or minimal heart disease
Antiarrhythmic Drugs vs. Ablation (PVI) for Paroxysmal AF

ThermoCool AF

- Paroxysmal AF 167pts
  - Catheter Ablation: 106
  - AADs: 61

- PVI 100.0%, CTI 35.9%, Linear Ablation 22.3%, SVC 16.5%, Non-PV trigger 16.5%.

- Freedom from recurrence at 9 months.
  - Ablation: 66%
  - AAD: 16%

EGM-Guided PVI
CFAEs and Linear Ablation for Persistent AF

STAR AF II

✓ Persistent AF 589 pts (PVI: 67, PVI + CFAE: 263, PVI + Roof + Mitral Line: 259)
✓ No difference in long-term outcome between the 3 strategies.

Freedom from recurrence at 18 months (Log-rank P=0.15).

- PVI: 59%
- PVI + CFAE: 49%
- PVI + Roof + Mitral Line: 46%

Left Atrial Fibrotic Substrate Ablation as an Adjunct to PVI
Patients with localized LVd in the posterior wall. Note mid and lower posterior lines enclosing LVd.
Case Presentation

- 78yo, male Pt with persistent AF
- Broad low voltage area in the LA on Voltage map
AF Termination during Ablation at the LA Roof
Ventricular Fibrotic Substrate Ablation

VT / VF
LV and RV Endocardial Electroanatomic Voltage Mapping
Endocardial and Epicardial Electroanatomic Voltage Mapping
Ablation LV Endocardial

Bipolar

4-LV voltage > 91 Points

Bipolar

3-LV rfa > 159 Points

Arruda et. Al.
VF Storm – Cardiogenic Shock
Status post CABG and mitral valve repair

- Frequent VT/VF episodes preceded by a single PVC
- Refractory amiodarone
- EF 25%, global LV hypokinesis
- Circulatory support - Impella

ECMO ↔ Catheter Ablation
Monomorphic VT (RBBB Morphology and superior Axis) changed to Fast Polymorphic VT
Monomorphic VT (RBBB Morphology and superior Axis) changed to VF

DC Shock
Elimination of VT/VF After Fibrotic Substrate Homogenization

<table>
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<tr>
<th>VT</th>
<th>PM at LV septum</th>
<th>LV Voltage map</th>
<th>Scar Homogenization</th>
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Intracardiac Echo (ICE)
In The EP Lab
ICE-Guided Pulmonary Vein Electrical Isolation
ViewFlex™ Xtra ICE Catheter

Anterior / Posterior
Left / Right
Trans-Septal Puncture
ICE Assessment of Catheter Contact
Case Presentation
76yo, Female,
PVC from Anterior Papillary Muscle
Clinical PVC RBBB / Inferior Axis Morphology
Activation Mapping at the APM

SR  PVC

I  II  aVF  V1

RA

p  ABL  d

p

CS  d
ICE Imaging to guide Ablation at Pappilary Muscle
Pace Mapping at the APM

PVC

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PM

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VT during RF Ablation at APM
Pericardial Effusion
Before Transeptal Catheterization
Pericardial Effusion

After Pericardiocentesis
Saline Irrigation - tip of Ablation Catheter
RF Lesion Formation in the LA

During RFA

After RFA
Atrial Fibrillation
Non-Pharmacologic Management

Left Atrial Appendage Occlusion
Stroke Prevention
LAA Closure for Stroke Prevention in NVAF
Atrial Fibrillation Clinical Pathway

Atrial Fibrillation Confirmed by ECG

Stable Patient? CP, SOB, HF

No

Emergency Department

Yes

Heart Rate Control
- Beta Blockers
- Diltiazem, Verapamil
- Digoxin
  ✔ Contra-indications
- Target Heart Rate: Resting 70-110 bpm

Stroke Risk Assessment
- Oral Anticoagulation
  CHADS2-VASc ≥1 ?

Valvular Disease By Echocardiogram?

Yes

Warfarin

No

Warfarin NOACs LAAO

Underlying Conditions
- DM, HTN, HLP, Obesity
- Thyroid Disease, OSA, CAD, Valvular Disease, HF

Echocardiogram
- TSH
- Basic Metabolic Panel
- Lipid Panel
- Liver Function Tests
- Sleep Study

Restore Sinus Rhythm
- Cardioversion
  Antiarrhythmic Drugs
  - Flecaïnide, Propafenone
  - Dronedarone, Sotalol
  - Dofetilide, Amiodarone
  ✔ Contra-indications

Electrophysiology / Cardiology

- Catheter ablation
  - Atrial Fibrillation
  - AV junction + Pacemaker
- LA Appendage Occlusion

Stress Test
- Exercise, Pharmacologic
- Nuclear
- Left Heart Catheterization
LAA Anatomy - LAA were were distributed into 4 morphologies  932 AF patients

Cactus (30%)  Chicken Wing (48%)  Windsock (19%)  Cauliflower (3%)

Di Biase et al. JACC 2012, 60: 531-538

LAA Closure Devices

Endocardial
- PLAATO
- Watchman
- ACP
- Amulet
- Coherex
- Prolipsis
- Occlutech
- PFM Medical
- Lifetech
- Cardia
- Gore

Epicardial
- SentreHeart CE, FDA 510K
- AEGIS

Surgical
- AtriCure
- Medtronic
- Maquet
WATCHMAN LAAC Device Overview

- Nitinol frame radially expands to maintain position in LAA
- 10 fixation anchors engage LAA tissue for stability and retention
- Polyethylene terephthalate (PET) membrane designed to block emboli from exiting the LAA

*Designed specifically for the left atrial appendage*
Assessment of LAA size for proper device choice

Tug test

20% Compression

Color Flow around device
WATCHMAN™ Device Endothelialization

Canine Model – 30 Day

Canine Model – 45 Day

Human Pathology – 9 Months Post-implant (Non-device related death)

Images on file at Boston Scientific Corporation.
Results in animal models may not necessarily be indicative of clinical outcomes.
Procedural Success

Implant success defined as deployment and release of the device into the LAA; no leak ≥ 5 mm

* The EWOLUTION Registry is a European prospective registry which reflects CE Mark indications for use which differ from the FDA indications for use.
1 Boersma, L.et al. EHJ; published online Jan 2016 in press; 2 Reddy VY, Holmes DR, et al. JACC 2016; Article in press
“Amulet is an investigational device in the US and not approved by FDA for commercial distribution.”
Amplatzer™ Amulet™
Device Implant Procedure

1. Measure LAA orifice, landing zone, depth
2. Deploy LOBE in landing zone
3. Deploy the DISC, to cover the ostium
4. Release

"Amulet is an investigational device in the US and not approved by FDA for commercial distribution."
Coherex WAVECREST LAA Closure Device
**Permanent Ligation Approximation Closure and Exclusion**

**ACCESS**

Standard techniques and technology for pericardial and transseptal access are utilized for placement. The .025” FindWire & EndoCATH are positioned.

**DELIVER**

The SoftIP is oriented to the target and the .035” FindWire is delivered to connect to the .025” FindWire at the target. The LARIAT is then advanced.

**CAPTURE/CLOSE**

With the snare opened, the LARIAT is advanced over the target and closed. After confirmation, the suture is released & tightened.

**REMOVE**

All catheters are removed and all that remains with the patient is a small remnant of suture used to close the target.
LARIAT® Suture Delivery Device

Thank You