

What's new in Cardiac Electrophysiology

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Disclosures

- None

Cardiac Event Monitoring

- Symptoms aren't specific ("palpitations"), documentation is key
- Cardiac monitors:
 - 24-48 hour Holter monitor
 - Event monitors: 1-4 weeks
 - Patient triggered events
 - Outpatient telemetry monitors: 1-4 weeks
 - Continuous real-time monitoring through a central location
 - Patient or automatically triggered

Cardiac Event Monitoring

- Implantable Cardiac Monitor (ICM)
 - “implantable loop recorder”
 - Patient triggered
 - Automatically triggered
 - for slow or fast HR, or irregularity

Implantable Cardiac Monitor

- Medtronic Reveal
 - 9cc
 - 6.2 X 1.9 X 0.8cm
- St. Jude Confirm
 - 6.5cc
 - 5.6 X 1.8 X 0.8cm
- About 3 year battery



Implantable Cardiac Monitor

- Medtronic Reveal LINQ
- 3 year battery life
- ~1cc = 87% smaller
- Easier implantation
 - <1cm incision
 - local anesthetic only
- The same (or better) arrhythmia detection





ICM Indications

- Unexplained syncope
 - When a cardiac source is considered
 - 23-33% uncovered a cause, usually sinus arrest or AV block
 - Using an ICM to direct therapy (usually a pacemaker) decreases the recurrence rate of syncope from 40% to 10%
 - Consider after or instead of an event monitor for infrequent episodes

- Circulation 2001; 104:1261–1267
- Circulation 2001; 104:2045–2050
- Circulation 2002; 105:2741– 2745

Cryptogenic stroke

- About 30% of ischemic strokes are cryptogenic
- Implantable cardiac monitors find A. fib in about 20-30% of patients at 1 year
- A. fib is often found >30days after implant
- This could change management to include oral anticoagulation

Stroke. 2013 Jul;44(7):2007-9

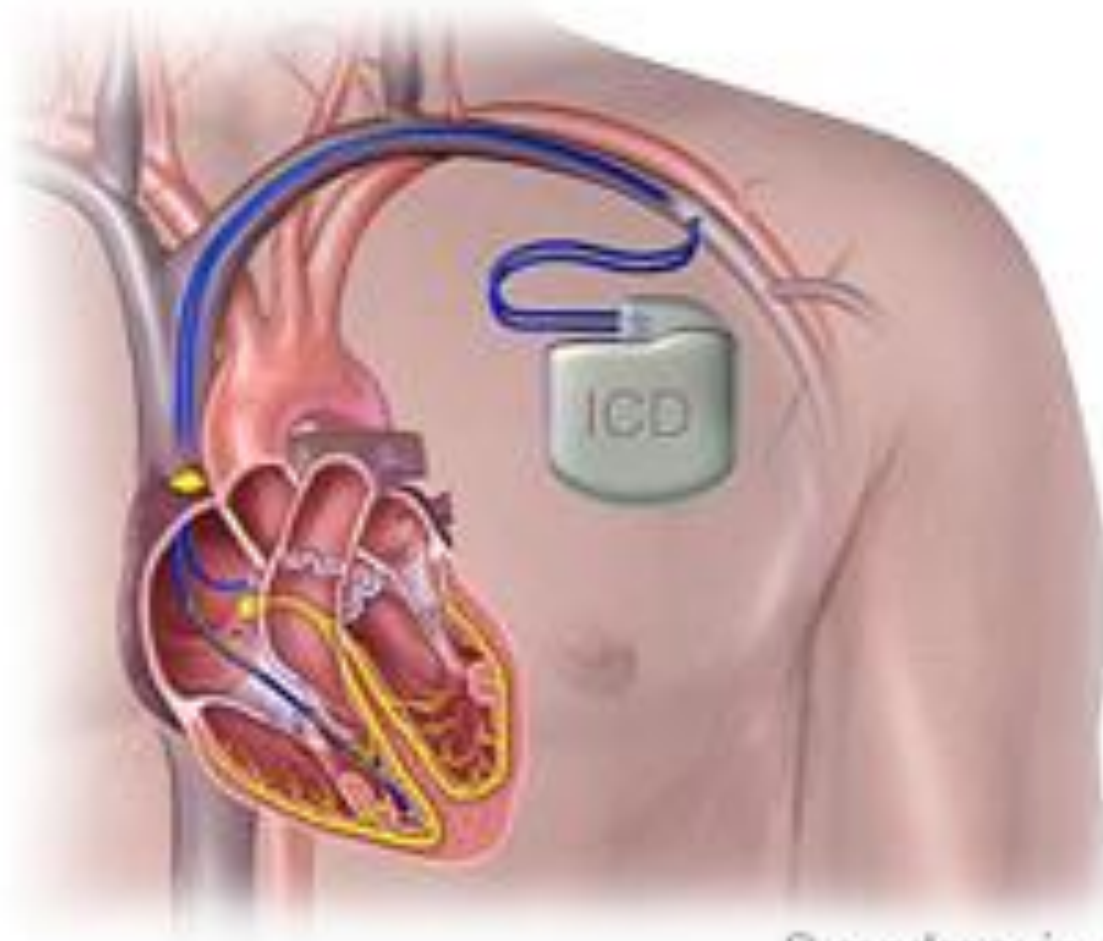
Stroke. 2013 May;44(5):1449-52.

Study of Continuous Cardiac Monitoring to Assess Atrial Fibrillation After Cryptogenic Stroke (CRYSTAL-AF)

ICM indications

- Palpitations
 - symptomatic, infrequent, not likely to be caught on shorter term monitors
- Monitoring a. fib burden
 - Up to 90% of a. fib may be asymptomatic
 - occasionally after a. fib ablation or mini-maze procedure

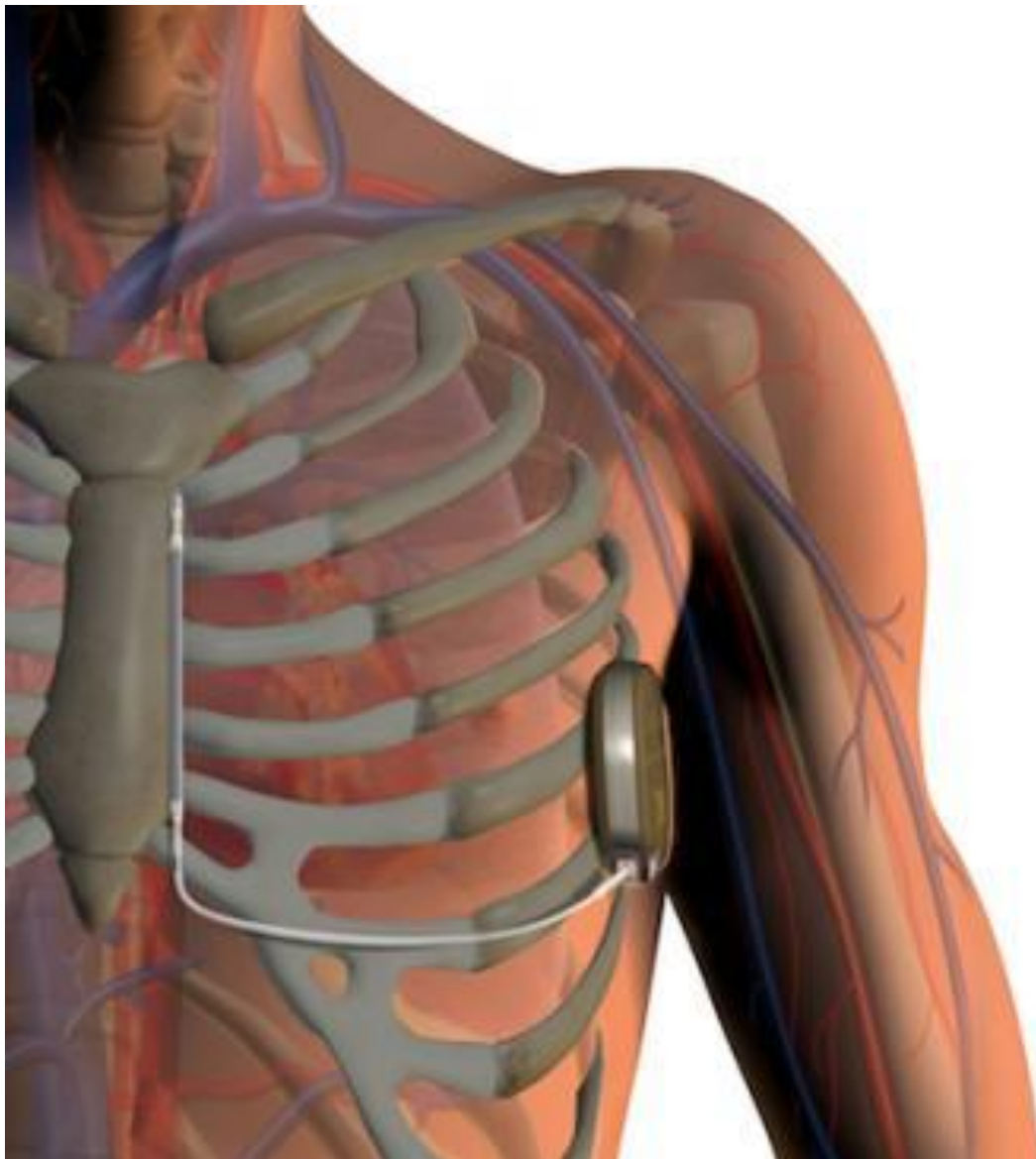
Implantable Cardioverter Defibrillator (ICD)



© medmovie.com

from the Heart Rhythm Society

Subcutaneous ICD



Subcutaneous ICD

- Boston Scientific (purchased Cameron Health)
- 6cm incision at ICD site, and 2cm incisions at the lower and upper sternum
- No intravascular leads

Subcutaneous ICD

- Pros:
 - Can defibrillate the heart out of VT/VF
 - No intravascular leads
 - Infection of S-ICD does not lead to systemic infection or endocarditis
 - Extraction of S-ICD does not put vessels or cardiac structures at risk of perforation or damage

Subcutaneous ICD

- Cons:
 - Cannot act as a pacemaker
 - Cannot provide anti-tachycardia pacing (ATP) to pace terminate VT
 - pace the ventricle slightly faster than the VT to terminate the VT
 - effectively terminates VT ~80% of the time

Subcutaneous ICD

- Patient selection:
 - not in patients needing pacing capabilities
 - not in patients who need a biventricular ICD
 - not in patients with known VT that could likely be terminated with ATP

Subcutaneous ICD

- Patient selection:
 - younger patients with inherited syndromes (long QT, Brugada syndrome, hypertrophic cardiomyopathy)
 - patients at high risk for sudden death, but no need for pacing
- As safe or safer than a transvenous ICD
- Effective at defibrillating VT/VF

Guidelines for Atrial Fibrillation

- Guidelines update March 2014
- 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society. *Circulation*. 2014;129

Anticoagulation for Atrial Fibrillation

CHADS2	Score
CHF	1
HTN	1
Age \geq 75	1
Diabetes	1
Stroke/TIA	2

Anticoagulation for Atrial Fibrillation

CHA ₂ DS ₂ -VASc	Score
CHF	1
HTN	1
Age >= 75	2
Diabetes	1
Stroke/TIA	2
Vascular dz (MI, PAD, aortic plaque)	1
Age 65-74	1
Sex Category (female)	1

Score	Adjusted stroke rate (%/yr)
0	0%
1	1.3%
2	2.2%
3	3.2%
4	4.0%
5	6.7%
6	9.8%
7	9.6%
8	6.7%
9	15.2%

Anticoagulation for Atrial Fibrillation

- CHA₂DS₂-VASc
 - redistributes patients (particularly older women) to high risk category
 - better discriminates low risk patients
- Selection of Oral Anticoagulation (OAC) should be based irrespective of the pattern of a. fib
 - paroxysmal, persistent, or permanent
 - patients often cannot feel every episode of a. fib
 - for patients with atrial flutter, OAC is recommended according to the same risk profile as a. fib

Anticoagulation for Atrial Fibrillation

- Non-valvular a. fib:
 - in the absence of rheumatic mitral stenosis, a mechanical or bioprosthetic heart valve, or mitral valve repair
- If CHA₂DS₂-VASc \geq 2 in non-valvular a. fib
 - OAC
- OAC choices
 - warfarin
 - Novel oral anticoagulants
 - Direct thrombin inhibitor
 - dabigatran
 - Factor Xa inhibitors
 - rivaroxaban
 - apixaban

Anticoagulation for Atrial Fibrillation

- If CHA₂DS₂-VASc = 1 in non-valvular a. fib
 - OAC, no OAC, or aspirin may be considered
 - (aspirin is poor at preventing cardioembolic strokes)
- If CHA₂DS₂-VASc = 0 in non-valvular a. fib
 - no OAC, no aspirin
- Valvular a. fib
 - warfarin
- In patients who have a. fib and a recent coronary stent, it may be reasonable to use plavix and OAC together, and omit aspirin
 - Aspirin + plavix + OAC increased bleeding versus plavix + OAC, without changing stent thrombosis

Cardioversion

- If CHA₂DS₂-VASc \geq 2, then anticoagulate after cardioversion per the guidelines
 - even if it's the first episode
 - because recurrence of a. fib is common

Bleeding Risk of Anticoagulation

HAS-BLED Score		
Letter	Clinical Characteristic	Points
H	Hypertension	1
A	Abnormal renal function	1
A	Abnormal liver function	1
S	Stroke	1
B	Bleeding tendency	1
L	Labile INR	1
E	Elderly (Age > 65)	1
D	Drugs (NSAID, ASA)	1
D	Drinking (alcohol abuse)	1

HAS-BLED score	Bleeds per 100 patient years
0	1.13
1	1.02
2	1.88
3	3.74
4	8.7
5 to 9	Insufficient data

“High risk” is considered ≥ 3

Ablation of Atrial Fibrillation

- A. fib ablation is reasonable in patients who have recurrent symptomatic a. fib despite the use of an antiarrhythmic (with a rhythm control strategy)
- A. fib ablation is more successful at controlling/preventing a. fib than antiarrhythmics
 - multiple randomized clinical trials
- 2 or more ablations might be necessary
 - recurrent a. fib, or atrial flutters
 - more common with:
 - more a. fib (months to years before ablation)
 - larger atria
 - comorbidities
 - sleep apnea

Ablation of Atrial Fibrillation

- Mini-maze procedure
 - Developed after open Cox-Maze procedure
 - thoracoscopic epicardial ablation
 - cardiothoracic surgeon (with training/interest)
- Hybrid procedure
 - mini-maze procedure
 - epicardial ablation, left atrial appendage ligation
 - percutaneous ablation 1-3 days later
 - check the ablation lines
 - perform ablation endocardially that cannot be done epicardially
 - combining the best of both procedures during one hospitalization to improve the success rate
 - consider for persistent a. fib (months, years)

Antiarrhythmics

- Dronedaronone
 - increases mortality in patients with recently decompensated heart failure and depressed LV function
 - contraindicated in patients with NYHA class III or IV, or decompensated heart failure in the previous 4 weeks

Radiation Exposure

- Fluoroscopy is necessary to visualize instruments (e.g. catheters, pacemaker leads, wires) introduced into the body
 - Radiation exposure for the patient, doctor, and cath lab personnel
- During ablations, 3 dimensional computer mapping software is commonly used to create a map of the cardiac structures
 - No fluoroscopy needed
 - Has been used for >10 years
- There is a goal by some to decrease radiation exposure significantly
 - Initially by pediatric cardiac electrophysiologists
 - My experience:
 - A. fib ablation now 5-8 minutes fluoro (was 30-45min)
 - SVT ablations now no fluoro (or 1 minute if trans-septal needed)

Questions