Cardiac Arrhythmias in Heart Failure

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Project ECHO®

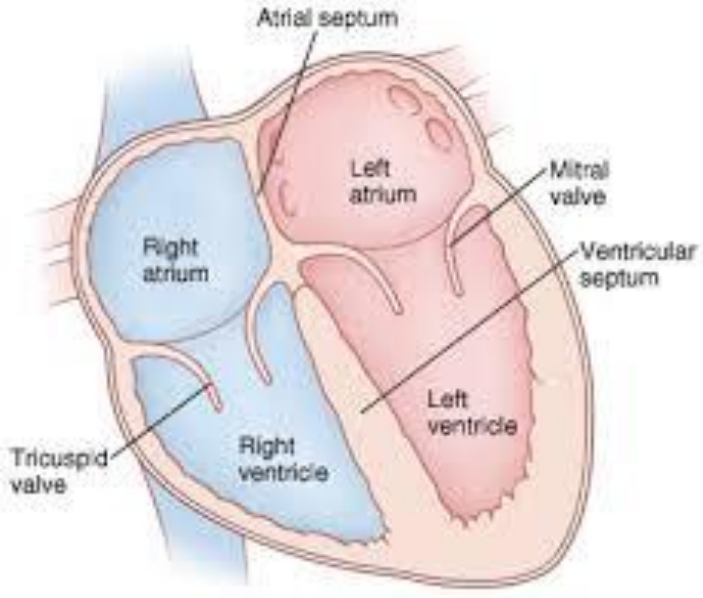
What arrhythmias are associated with HF and why do the matter?

- You can have any cardiac arrhythmia associated with HF but atrial fibrillation (AF) and ventricular tachycardia (VT) are highly prevalent and more prominent.
- Major drivers of mortality and hospitalization.
- Arrhythmias can be the cause and consequence of HF progression in many cases.

Pathophysiology

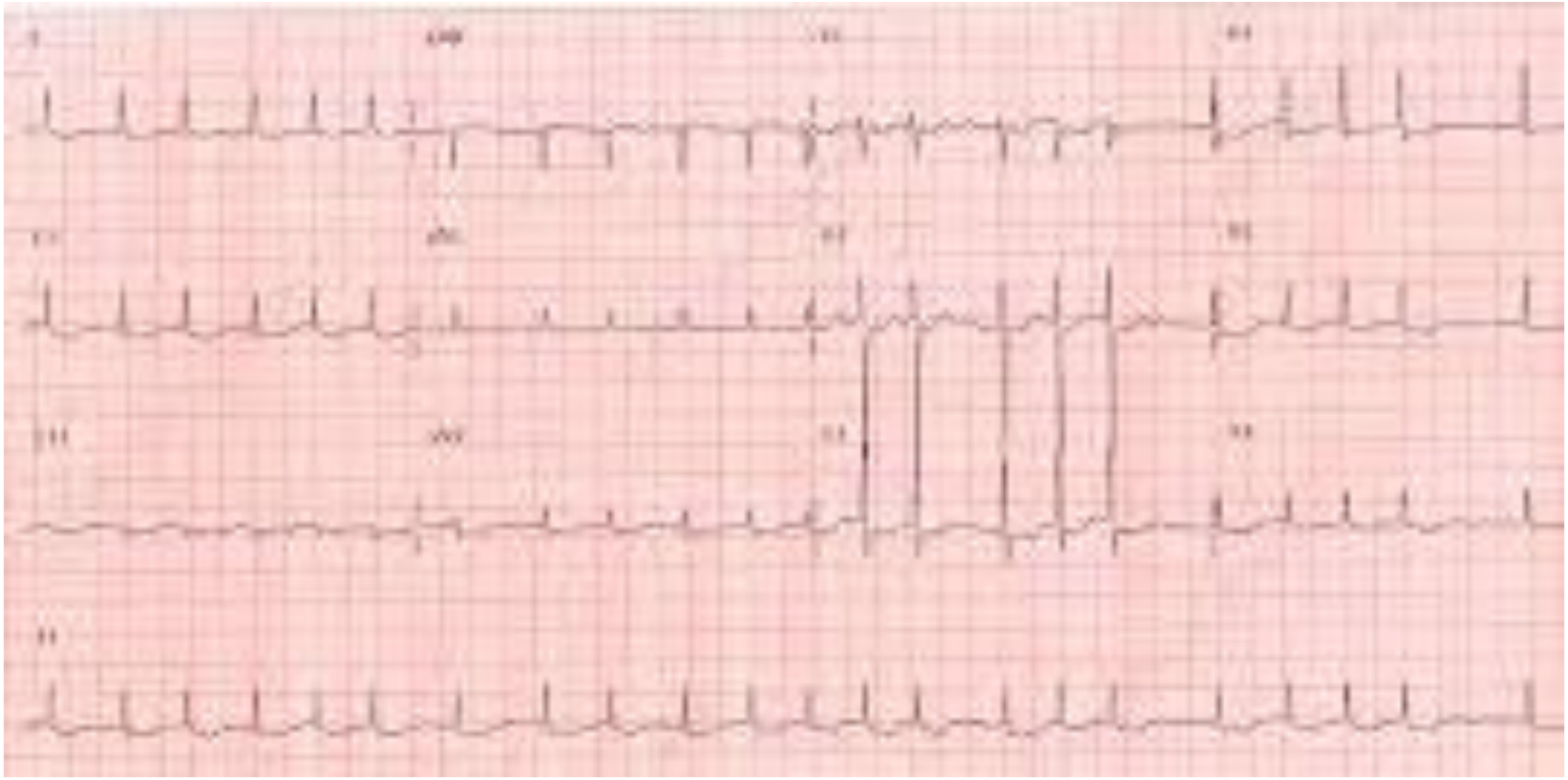
- Structural remodeling and fibrosis is one of the leading pro-arrhythmic processes in HF.
- Other processes include electrical remodeling and calcium dysregulation as well as neurohormonal and autonomic activation.

Atrial Arrhythmias



ischemic cardiomyopathy (NICM), sequela from other forms of HF.

- Bidirectional relationship with HF: Worsens cardiac output and LV filling (Loss of atrial kick)
- Up to 50% prevalence in HF
- Increased CVA risk



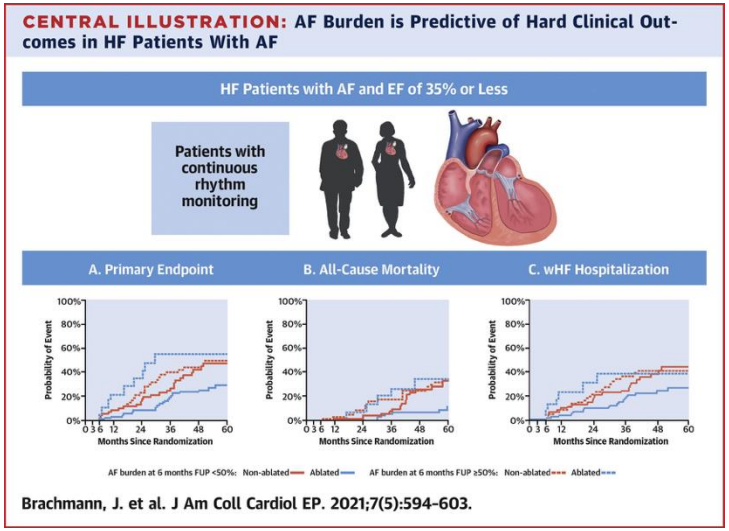
- Irregular R-R intervals
- No discernible P wave
- Uncontrolled rates persisting >110bmp risk for HF

AF: Rate vs Rhythm Control

- Everyone deserves a trial at rhythm control.
- Rhythm control is especially favored in HF patients due to clear evidence of benefit over rate control.

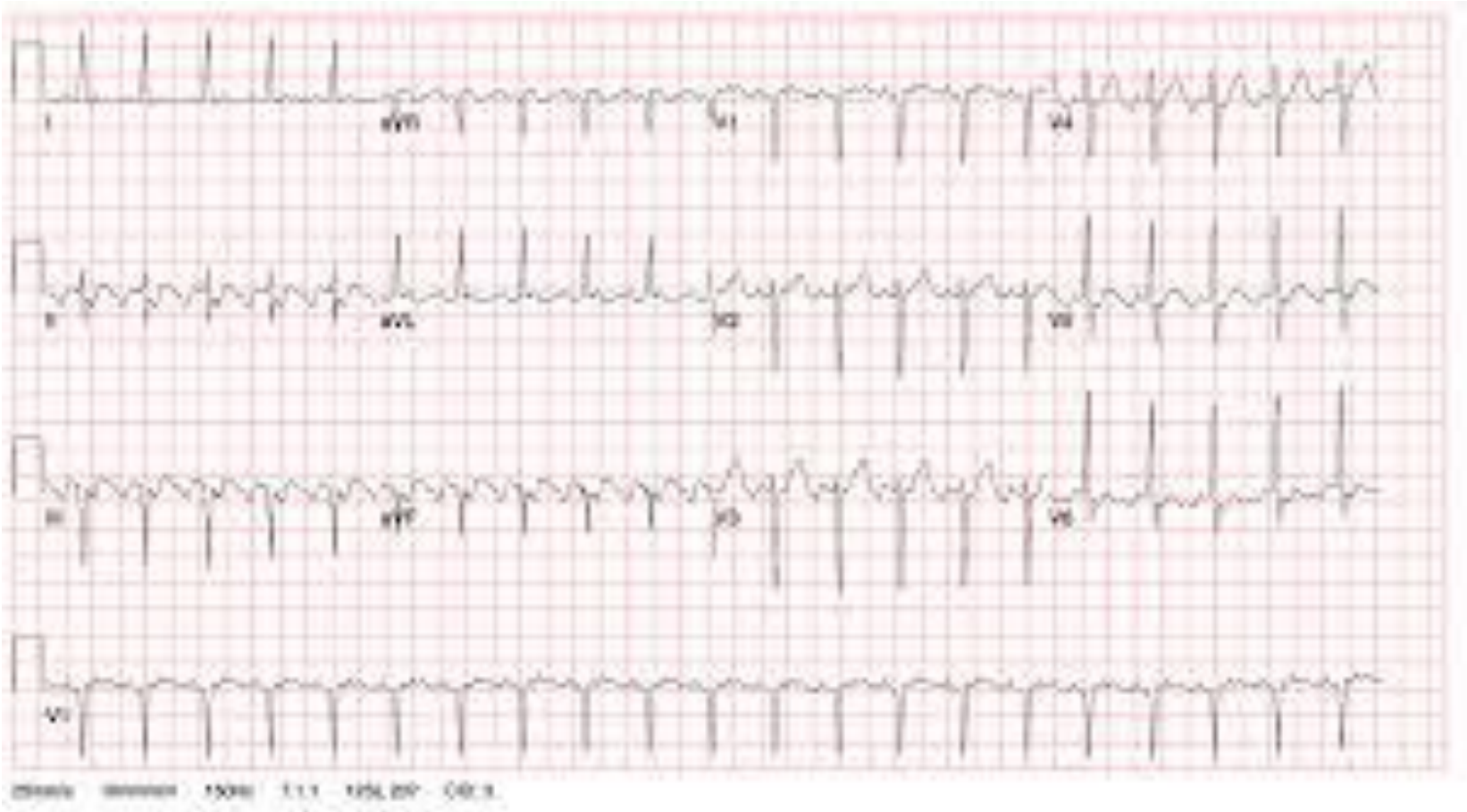
CASTLE AF Trial (2018)

- 363 patients with LVEF 35% or less were randomized into ablation (n179) vs medical therapy (n184).
- Median follow up of 37.8 months showed significantly lower rates of endpoints of death or hospitalization for HF in the ablation arm.
- All-cause mortality: 13.4% vs 25.0%
- HF hospitalization: 20.7% vs 35.9%
- Reduction of AF below 50% burden at 6 months was a strong positive predictor and ablation was upgraded to Class I.
- All patients had implanted ICD/CRT-D for Afib monitoring.
- Later expanded by CASTLE-HTx trial in 2023 for end-stage HF.



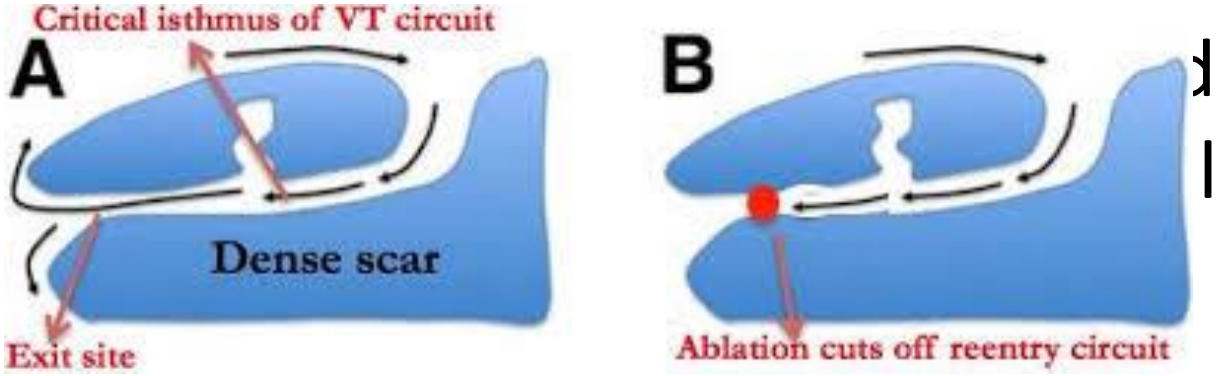
Other Atrial Arrhythmias

- Atrial flutter- ablation is first line and usually curative especially in typical flutter.
- Can develop atrial tachycardias.
- These arrhythmias can affect HF patients similarly as AF.



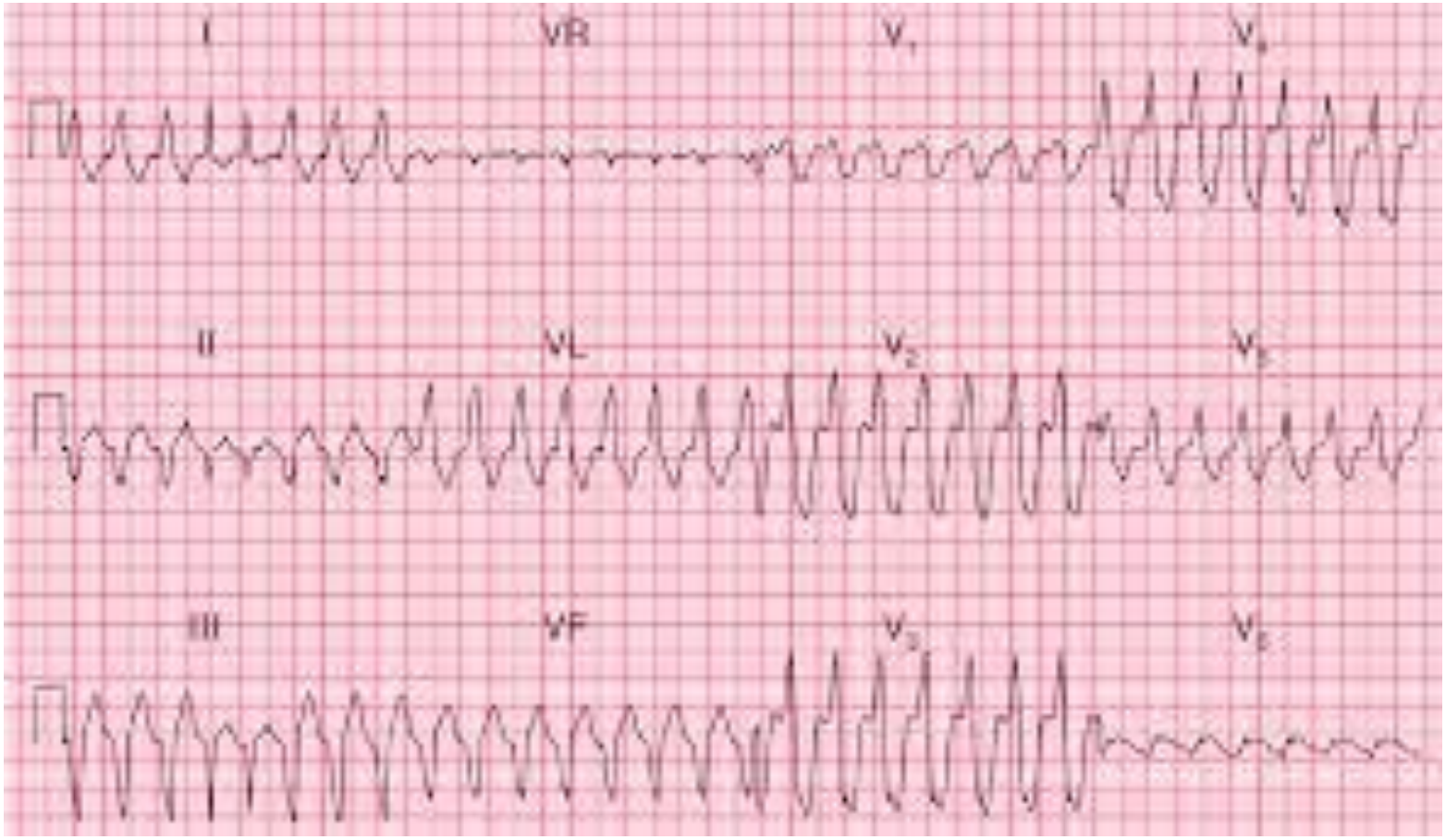
- Saw-tooth appearance
- Regular R-R intervals

Ventricular Arrhythmias



d PVCs (greater
lly in ICM.

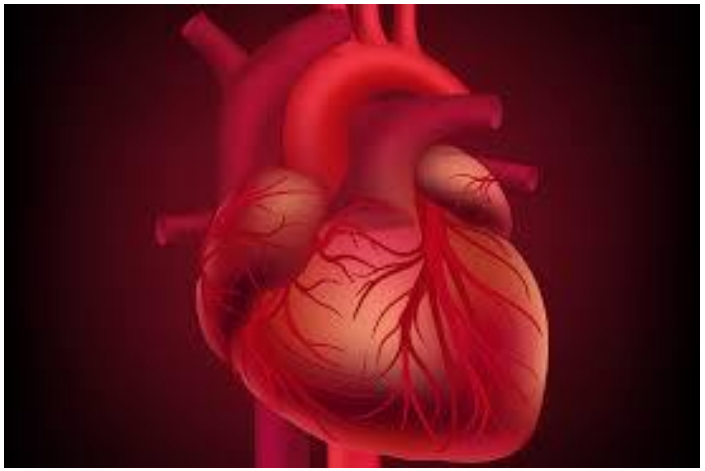
- Cause of sudden cardiac death.



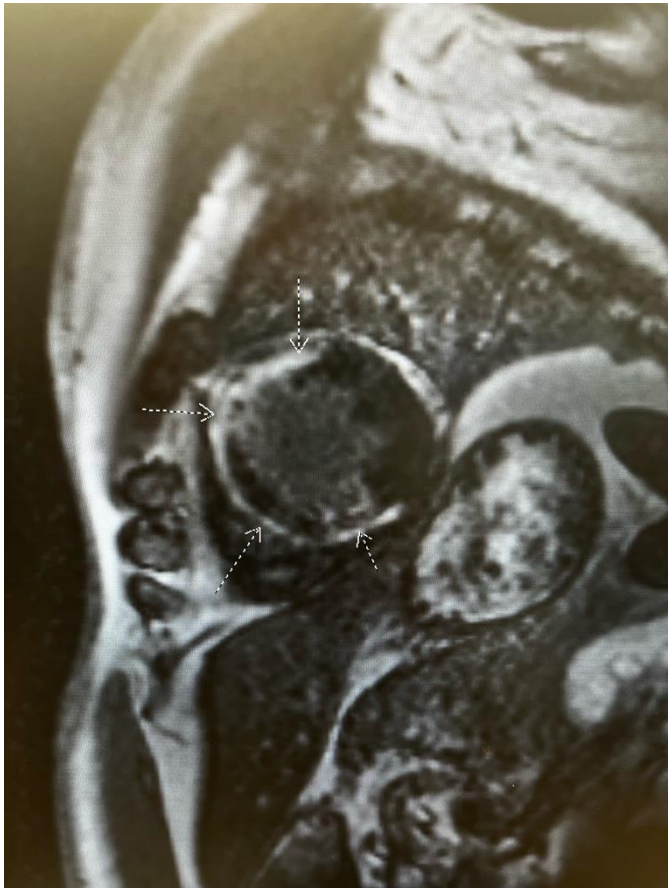
- Fast wide QRS complexes
- Regular R-R interval

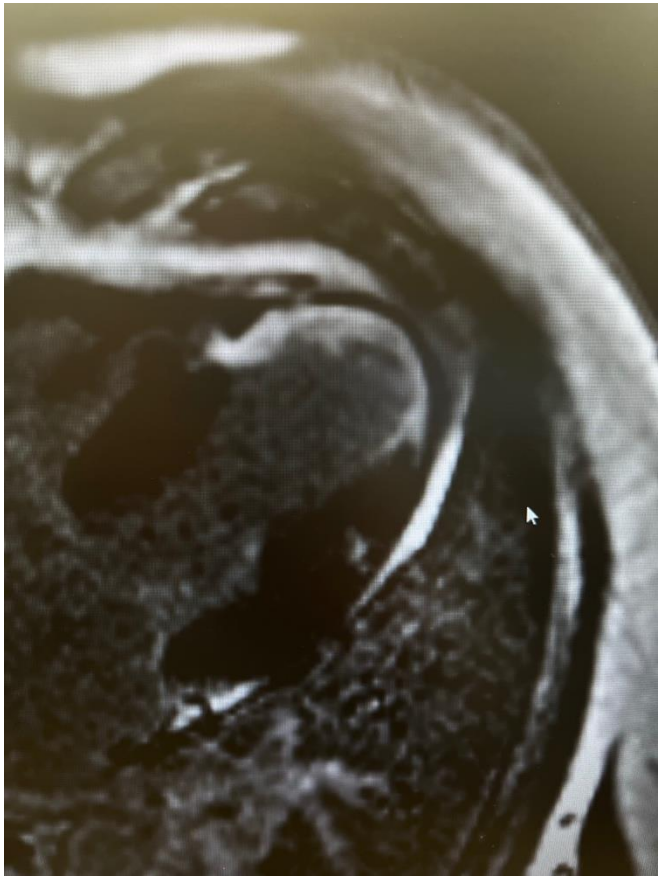
Cardiac MRI

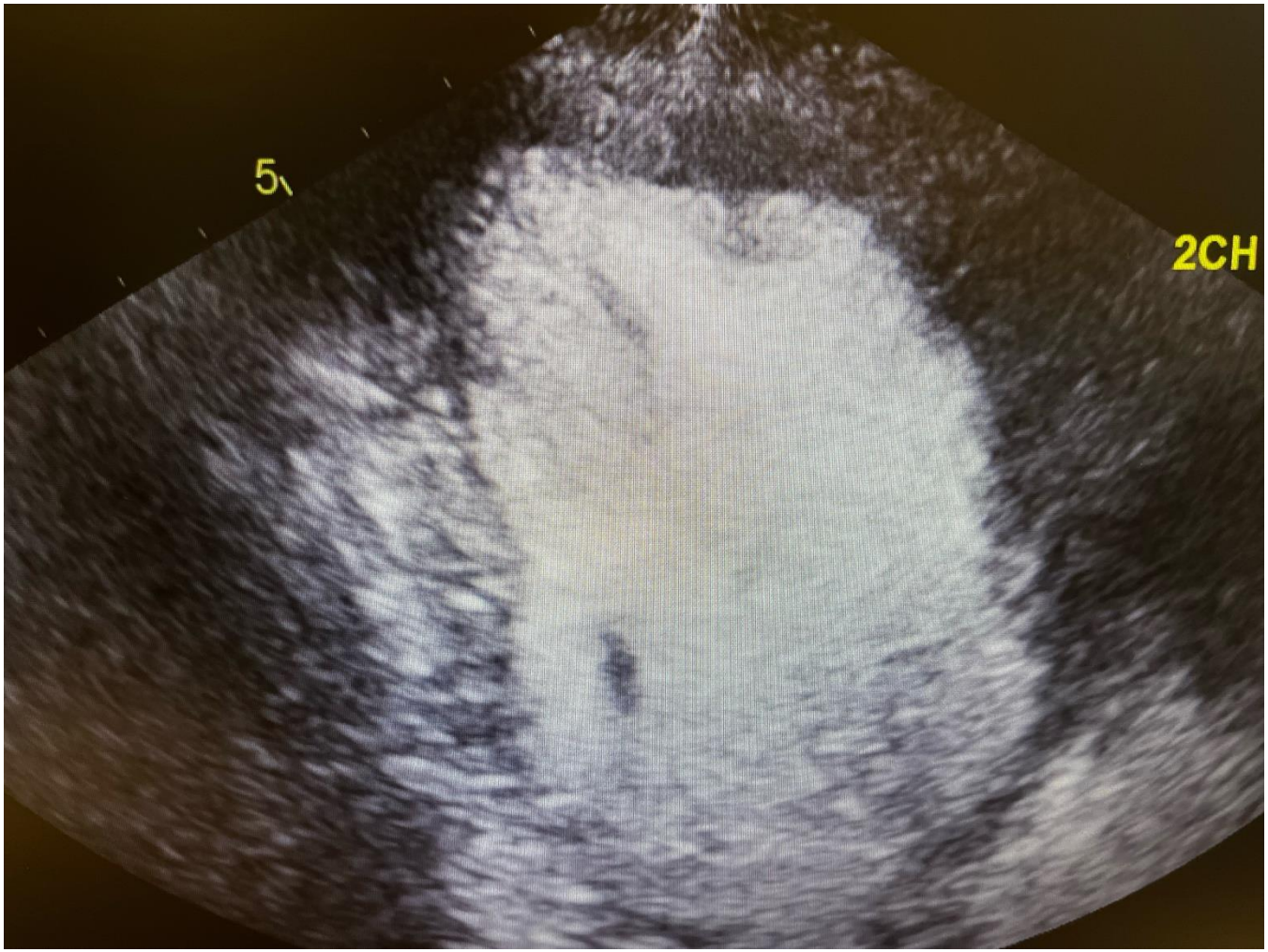
- Cardiac MRI is the gold standard for evaluation of myocardial scarring.
- Scar pattern can be used to guide diagnosis and also guide prophylactic ICD implantation depending on percentage of scar burden.



Cardiac MRI



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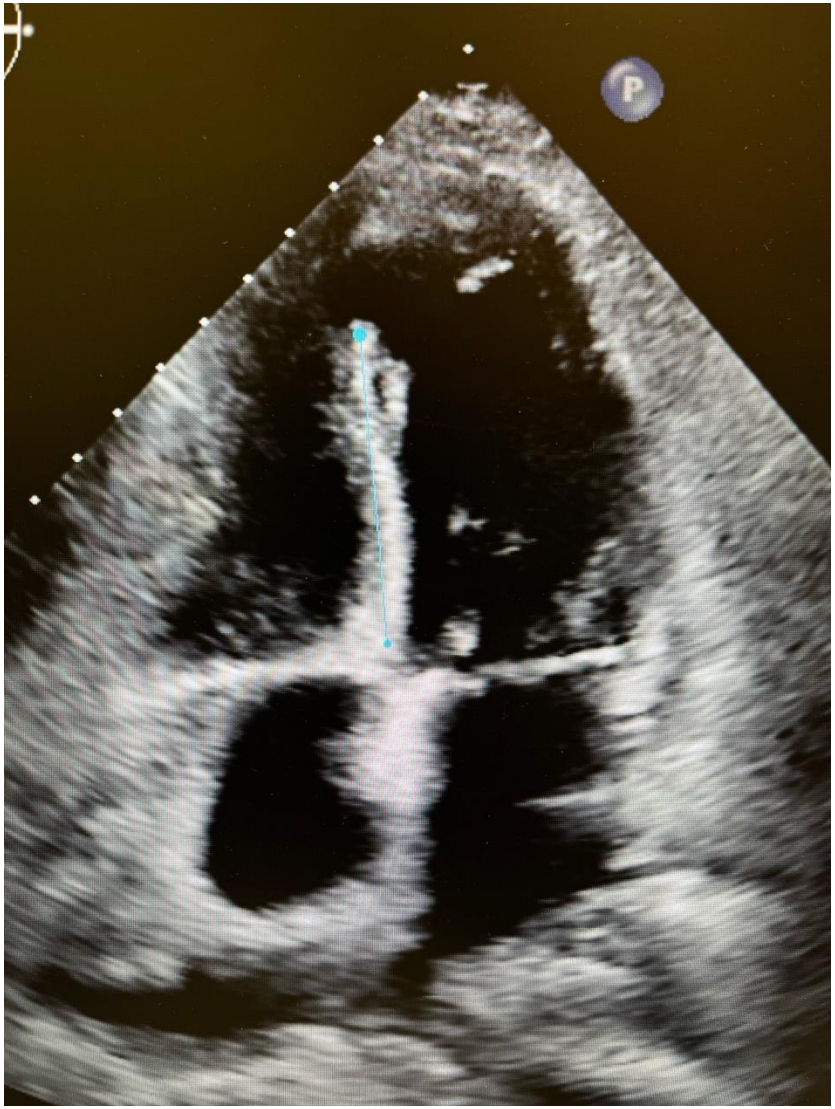
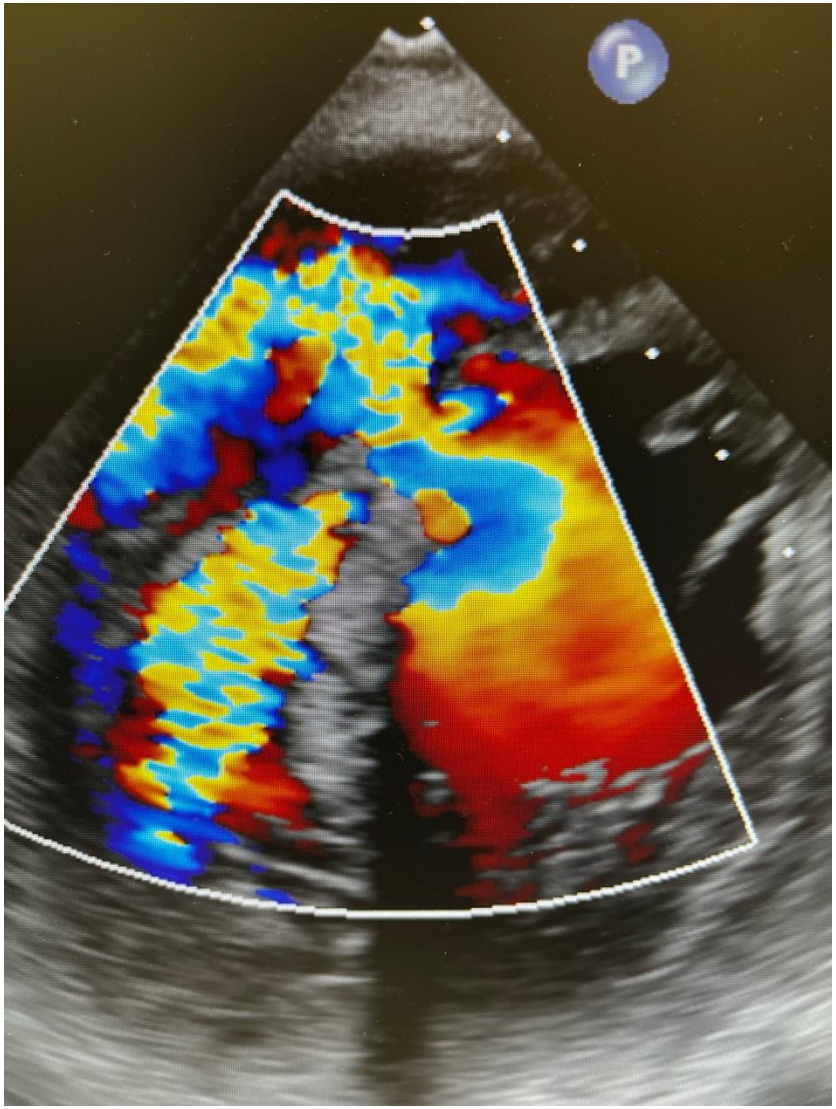




Classes of Antiarrhythmics

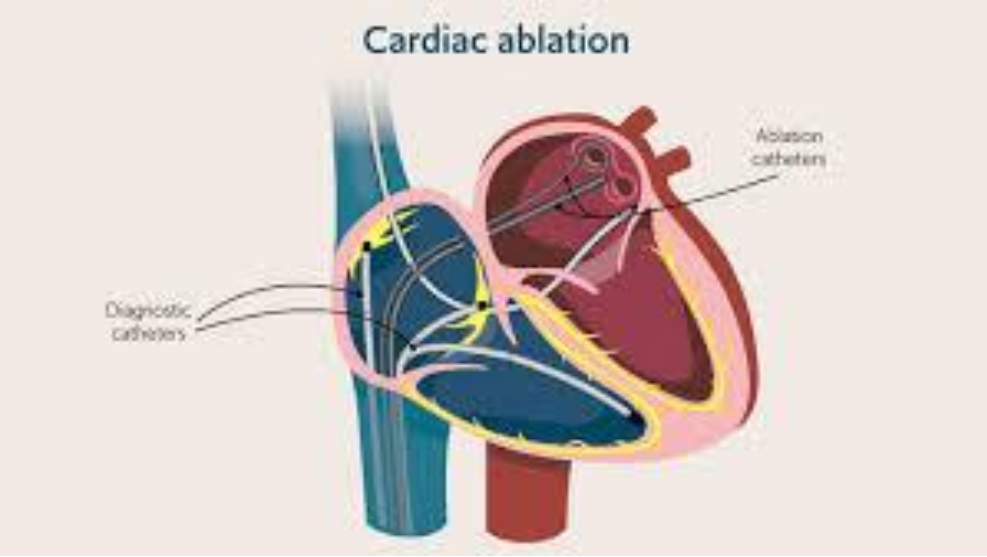
- Class I: Sodium channel blockers
  - Ia: Quinidine, procainamide, ect
  - Ib: Lidocaine, mexiletine, ect
  - Ic: Flecainide and profafenone (No no in HFrEF)
- Class II: Beta Blockers
- Class III: Potassium Channel blockers
  - Amiodarone, sotalol, dofetilide
- Class IV: Calcium channel blockers (Avoid in HFrEF except for amlodipine. Negative ionotrops)

Antiarrhythmics in HF

- Amiodarone: very effective for both atrial and ventricular arrhythmias.
  - Class III antiarrhythmic affecting Na+, K+ and Ca++ channels.
  - Monitor for side effects.
- Avoid class IC agents such as flecainide and propafenone with HFrEF 40% or less (CAST trial showed 2-3x mortality in post MI. Increases proarrhythmic risk).

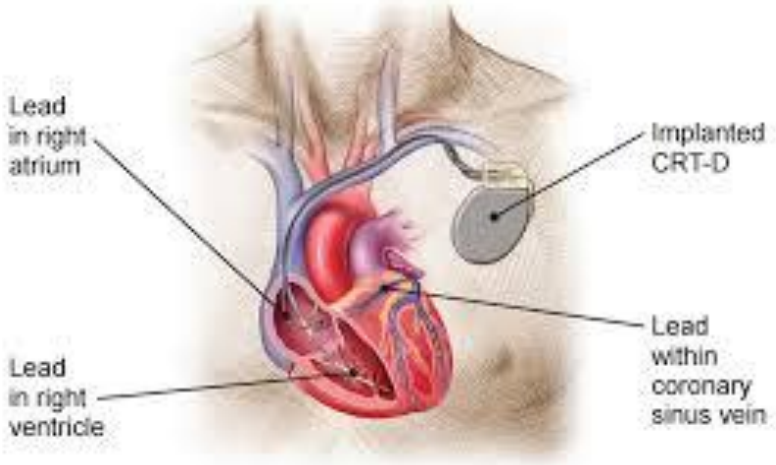
Role of catheter ablation in VT/PVCs

- Recurrent or refractory VT is a strong indication for ablation.
  - Helps to avoid future ICD discharges.
- High PVC burden causing systolic dysfunction.



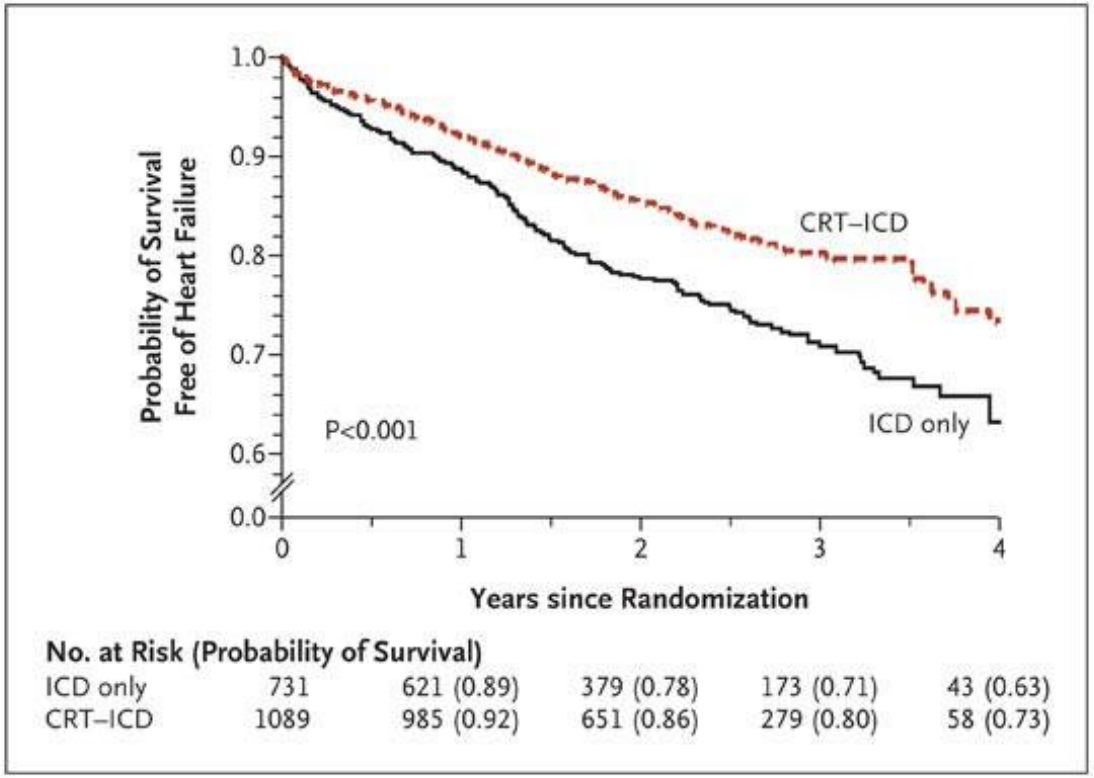
Cardiac Resynchronization Therapy (CRT)

- CRT is indicated in patients:
  - Usually NYHA class II-IV
  - LVEF less than 35%
  - QRS duration 130ms or greater.
- CRT reduces sudden cardiac death and can improve LVEF.



MADIT-CRT Trial (2014)

- 1820 patients with both ICM and NICM randomized 3:2 into CRT-D (1089) vs ICD (731).
- Primary outcome of 34% reduction in death or HF events (Most benefit in HF events).
- ICM with class I/II or NICM with class II symptoms, LVEF 30% or less, QRS of 130ms or greater.
- Improved cardiac remodeling.



Devices are not risk free

- Inappropriate discharges from ICD which can be up to 10% of patients per year.
  - Some patients chose CRT-P and not CRT-D depending on goals of care.
- Device related endocarditis ranges from 0.5% on initial implant and can rise to 7% over the life of the device with repeat gen changes.
- Pneumothorax
- Shared decision approach, especially in patients with multiple health issues.

Device Monitoring

- Usual approach is a mix of home and in clinic.
  - PPMs and ICDs both have constant home monitoring. In-clinic downloads and interrogations occur every 6-12 months and 3-6 months respectively.
  - Some challenges to in home monitoring:
    - Poor/no internet connection
    - Compliance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Bradyarrhythmias in HF

- Sinus node dysfunction- PPM
- AV block- If high degree- PPM
  - Often seen in infiltrative cardiomyopathies such as amyloidosis or cardiac sarcoidosis.
- Iatrogenic from HF medications.

Key Takeaways

- HF symptoms and outcomes are worsened by arrhythmias.
- There are multiple treatment options available.
- Choosing the right treatment is individualized to each patient.
- Antiarrhythmia treatments decrease mortality and morbidity.

Thank you for listening!!