Atrial Fibrillation is Common

- #1 sustained cardiac arrhythmia
- >3,000,000 patients
- 1% of US population
- 9% of all those ≥ 80 yo
- AFib ED visits ↑33% in past 5 years

How many causes of Atrial Fibrillation are there?

There Are 5 Causes of Atrial Fibrillation

- Pericardium
- Myocardium
- Endocardium
- Pulmonary
- Hypersympathetic

Pericarditis
LVH, Myocarditis
Endocarditis, Valvular
PE, pulmonary hypertension
Cocaine, amphetamines, hyperthyroid, ETOH withdrawal, caffeine, beta agonists, fever, dehydration

There Are 5 Types of Atrial Fibrillation

- Paroxysmal
- Persistent
- Long Standing
- Lone AF
- Recurrent

Terminates spontaneously < 7 days
> 7 days of continued AF
1 year or more
No risk factors and < 60
Repeated episodes often subclinical and not recognized
What are the 5 steps in the treatment of ED patients who present with either new AFib/Flutter or AFib with RVR?

5 Step ED Dx - Rx
- Secure ABCs
- Determine etiology
- Beta Blocker vs Diltiazem for RVR
- Establish stroke risk (CHA$_2$DS$_2$-VAsc)
- Cardiovert, Admit or D/C on meds

Why is Atrial Fibrillation so dangerous?

Stroke Is The Biggest AF Risk
- 5% year if no anticoagulation
- 10% year if prior CVA or TIA
- Anticoagulation decreases CVA risk by at least 2/3

Atrial Fibrillation Equals an Increased Stroke Risk
- About 0.5-1% per year but can be higher
- 5% if no anticoagulation
- CHA$_2$DS$_2$-VAsc – important determinant
- Silent cerebral ischemia by CT/MRI is 20-40%
- AF doubles risk of death from age 55 onward

AFib = ↑↑ Stroke Risk
You need to calculate another score: \( \text{CHA}_2 \text{DS}_2 \text{-VASc} \)

Always Calculate the Patient’s Score

\( \text{CHA}_2 \text{DS}_2 \text{-VASc} \)

- CHF (1)
- Hypertension (1)
- Age ≥ 75 (2)
- Age 65 – 74 (1)
- Diabetes Mellitus (1)
- Stroke/ TIA/Thromboembolic (2)
- Vascular DSX (AMI, PVD, Aortic Plaques (1)
- Sex Female (1)

Stroke Risk and CHADS2 Score

Which is best for patients: Rate or Rhythm Control

In General: Rate Control is Superior to Rhythm Control

- Classic article, 4,060 pts, multicenter
- Average age 70 yo ± 9
- Rate controlled patients had less hospitalizations
- More adverse effects in the rhythm group
- Slightly more deaths too (p = ns; 0.08)

ED Rate vs. Rhythm Control

- Meta-analysis of 4 ED relevant studies
- 1438 patients with new onset AF
- **Rate control** if older, chronic AF
- **Rhythm** > rate control if < 65 yo and healthy
Younger, healthier patients do better with therapy directed at keeping them in sinus rhythm.

Older, sicker patients do better with their AF rate controlled.

5 Step ED Dx - Rx

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There Are 5 Routine Tests for All New AF Patients

- CBC
- BMP
- Thyroid
- CXR
- Echocardiogram (sooner or later)

Consider Additional Tests

- BNP R/O HF
- Troponin R/O ACS
- Exercise Testing WPW, Inducible, ACS

A 67 year old woman presents with atrial fibrillation with rapid ventricular response, HR between 140-160. She has a history of HF, is very SOB, and sounds wet. BP is 160/100.
Should you always provide rate control in borderline sick patients with Atrial Fibrillation and RVR?

Is rate control for atrial fibrillation with RVR always the best strategy?

- 416 patients with AF
- All patients had “complex” AF
- Complex = an acute underlying illness
- 2 Canadian University affiliated EDs

Major Complications

- Shock requiring vasopressors
- Intubation or NIPPV
- Bradycardia requiring pacing or meds
- Stroke or embolic complication
- CPR or death

Major Adverse Complications

<table>
<thead>
<tr>
<th>Rate or Rhythm Control Attempted</th>
<th>No Rate or Rhythm Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>40.7%</td>
<td>7.1%</td>
</tr>
<tr>
<td>33.6% absolute difference</td>
<td>82% relative decrease</td>
</tr>
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Effective Rate Control (> 20 BPM)

- (Elec, Dilt, BB) (Crystalloid, Bronchodilator)
- 25.5% absolute difference
- RR = 2.3
Electrical cardioversion was only effective in 13.3% of these sick patients.

AF Rate or Rhythm Control in Sick Patients

Take Homes

- Rarely effective
- Dangerous
- Focus on underlying disease before attempting to control rate or rhythm

A patient presents with likely PSVT – is adenosine 6 mg or adenosine 12 mg IV push best?

Adenosine can kill patients with bypass tracks if: Wide and Irregular

Adenosine increases rapid bypass tract conduction and can result in very fast refractory VFib.
Wide complex Afib and Adenosine =
A rapid Vfib death

Don’t Use Adenosine

- Never give if irregular (beware wide!)
- Never give if rate ≤ 150
- Never give if slows to vagal stim
- Careful if hx of Afib, Aflutter, MAT
- Careful if hx of CHF, COPD, WPW

Rate Control in AF with RVR
• Calcium Channel Blockers
  - Diltiazem 25 mg over 1-2 min
    May ↑ to 35 mg over 1-2 min if inadequate response after 5 min
• Beta Blockers
  - Metoprolol 5 mg IV q 5 min up to 3 doses
  - Esmolol 0.5 mg/kg over 1 min 0.05 – 0.1 mg/kg/min titrate to effect

Rate Control for AF with RVR
• Although cardiologists seem to prefer Metoprolol, Diltiazem is as good or better for AF with RVR
• No increased toxicity
• Be careful with dosing
• Older, frailer patients should get less
• Premedicate with 1-2 cc of Ca Gluconate?

The role of Digoxin in Atrial Fibrillation is controversial – it may increase mortality or be a marker for those who will do badly regardless of its use
• In general – don’t be the one to start it
A 47 year old man presents with new onset atrial fibrillation. He has well controlled hypertension and no history of AFib. He felt his heart start to beat “funny” a few hours ago after running?

Can you safely convert rate stable Atrial Fibrillation and Flutter?

Safety of ED Cardioversion

- Very safe if no thrombus
- Risk of CVA increases over time
- TEE required if onset unknown or > 48 hrs
- New evidence suggests maybe > 12 hrs

Risk of CVA S/P Cardioversion without anticoagulants

0-48 hrs onset = 0.7%

Pharmacological Cardioversion

- Used Procainamide (180 pts, 62% of total)
- 500 mg then, if needed, to 1,000 mg
- 50% converted pharmacologically
- 500 mg converted 44%, 56% took 1,000 mg
- Not if prolonged Q-T or Hypotensive

- 289 stable patients, new onset AFib
- Included patients with AF > 48 hrs (51/289)
- Excluded unstable patients
- Excluded admission-requiring illnesses
- Average age 64 ± 14; HR 125 ± 26
Neither A-P nor A-L Pad Placement is Superior

- Meta-analysis 13 studies
- 836 AP pts vs 856 AL pts
- Trend toward AL > AP if biphasic

Cardioversion for Fib/Flutter

- AHA recommends 120-200J biphasic
- 50-100J for flutter
- My bias: Use highest recommended: 200 or more
- AP or AL – your choice
- Switch positions if unsuccessful

Who Needs an Echo in AF

- Transesophageal (TEE) not Transthoracic
- Used to R/O thrombus pre cardioversion
- Mandatory if sx > 48 hrs or unknown
- May be used if > 12 hrs or older pts
- Not required in younger healthy pts if onset is acute and heralded by specific symptoms

Is Canadian “aggressive care” with cardioversion effective and safe?

- 1,091 pts, mean age 63.9 years, 2010-2012
- 6 academic centers, 84.7% AFib, 15.3%Aflutter
- Clear history of onset ≤ 48 hrs
- Clear 7d history and no thrombus by TEE

Study excludes patients with other primary diagnoses or complaints including:
- ACS
- CHF
- Pneumonia
- PE
- Sepsis and/or SIRS criteria
Rapid ED Cardioversion
Initial Therapy

- Rhythm control in 72.8%
  - 39.1% electrocardioversion first
  - 33.7% rhythm converting drug first
- Just rate control in 17.8%
  - Metoprolol 65.1%
  - Diltiazem 32.2%

Pharmacologic Rhythm Control

- Procainamide used in 85%
- Converted 52.2% of patients
- Use 35-50 mg/min (up to 20 mg/kg)
- Can go faster - but careful!

Synchronized Cardioversion Effectiveness

- 90.0% successful electrical conversion
  - Mean max energy 148 joules
  - 1.4 mean shocks required

Is Canadian “aggressive care” with cardioversion effective and safe?

- 80.1% conversion to sinus rhythm
- 1 stroke and no deaths at 30 days
  (89 yo F on coumadin who had spontaneously converted in ED)

Do patients you see in new AFib need to be anticoagulated…? How about if you can convert them?

<table>
<thead>
<tr>
<th>CHA2DS2-VASc</th>
<th>Agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>NOAC or discuss</td>
</tr>
<tr>
<td>2</td>
<td>NOAC or Warfarin</td>
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</table>
Non-vitamin K anticoagulants now endorsed in ACC/AHA guidelines.
Check carefully for use/dosage in CRF, valvular disease, obese, and s/p cardioversion.

Non-Vitamin K Anticoagulants
Novel Oral Anticoagulants
Direct Oral Anticoagulants
- Apixaban Eliquis anti-xa
- Dabigatran Pradaxa direct antithrombin
- Edoxaban Savaysa anti-xa
- Rivaroxaban Xaralto anti-xa

Are the non-vitamin K oral anticoagulants safer than Warfarin?
- 76,354 pts
- Compared each non-vit K drug to Warfarin
- Apixaban lowered stroke risk 33% vs Warfarin
- Apixaban and dabigatran lowered GI bleed risk
- All decreased risk of intracranial bleeding

Warfarin use is decreasing and is becoming relegated to mainly those patients with:
- Mechanical Heart Valves
- Mitral Stenosis
- Chronic Renal Failure

Anticoagulation and ED Discharge

If you don’t discharge a patient on a non-vitamin K antagonist when indicated, it can take weeks-months for it to be started…and allow a preventable stroke to occur
How often do we not follow current recommended anticoagulation guidelines for high risk AFib patients?

- Two populations: CHADS$_2$ $\geq 2$ and CHADS$_2$VASC $\geq 2$
- 38.2% of 210,380 CHADS$_2$ $\geq 2$ got only ASA
- 40.2% of 294,642 CHADS$_2$VASC $\geq 2$ got only ASA
- More than 1 in 3 high risk for stroke AF pts treated below the standard of care!

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Summary

Atrial Fibrillation is common
Stroke is high risk
Always calculate CHA$_2$DS$_2$-VASc score
Anticoagulate if indicated
2 = yes, 0 = no, 1 = yes or discuss

Summary

- Treat underlying conditions
- Dilt or BB for rate control
- Cardioversion can be safe < 12-48 hrs
- Antiarrhythmics convert half
- 200 Joules biphasic works 90%

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