



Presented by the
Society of
Cardiovascular
Patient Care

May 25-27, 2016

scpc.org/Congress

Initial Evaluation and Early Stabilization: Best Practices for the AF Patient

Wayne Ruppert, CVT, CCCC, NREMT-P

This presentation is available for download by
visiting:

www.ECGtraining.org

select “[Downloads-PDF](#)”

from menu bar

then click on:

**“Initial Evaluation and Early Stabilization: Best
Practices for the AF Patient – SCPC 19th Congress”**

HOME

12 LEAD ECG IN ACS

STEMI ASSISTANT

ACCREDITATION

WORKSHOPS

ECG ID OF SADS

WORKSHOP OBJECTIVES

TEXTBOOKS

PHYSICIAN REVIEWS

TEXTBOOKS

PHYSICIAN REVIEWS

BIO OF WAYNE RUPPERT

TESTIMONIALS

DOWNLOADS - PDF

HELPFUL INFORMATION

CONTACT US

All materials featured on this page are copyright protected. This content is offered for INDIVIDUAL USE by Medical Professionals and students. This materials may not be recopied or reproduced in any manner and/or printed for sale or distribution without prior written consent of the author. EXCEPTION: Physicians and allied health professionals employed by or contracted by Community Health Systems (CHS) owned hospitals and all EMS agencies who routinely serve CHS hospitals may download, reproduce and distribute the documents and content electronically linked to this webpage for education purposes.

[Download Sudden Cardiac Death Prevention - SCPC 19th Congress](#)

[Download ACLS 2015 Algorithm Cheat Sheets](#)

[Download 2015 ACLS Algorithms with ECG examples](#)

[Download Neighbors Saving Neighbors Program](#)

[Download 2015 ACLS Algorithms with ECG examples](#)

[Download Neighbors Saving Neighbors Program](#)

[Download Basic ECG Course with 2015 ACLS Algorithms](#)

[Download STEMI Assistant](#)

[Download ECG ID of SADS CONDITIONS](#)

[Download ECG Review of Hypertrophy](#)

[Download 14 Point AHA Screening Form for Genetic and Congenital Heart Conditions](#)

[Download QTc Prolonging Meds - Hospital Policy & Procedure](#)

[Download Preoperative ECG Evaluation 2016](#)

[Download Perioperative Considerations for Patients with CIEDs](#)

[Download 12 Lead ECG in ACS Handout](#)

[Download LQTS in Anesthesia](#)

[Download First Aid Presentation](#)

[DOWNLOAD ACS & STEMI - St Joseph's Hospital Presentation](#)

[Download 2011 HRS Perioperative Management of CIEDs](#)



Wayne Ruppert: Bio

- Developed curriculum for and instruct numerous cardiology education programs based on Cardiac Cath Lab and Electrophysiology Lab case studies
- Interventional Electrophysiology Technologist, St. Joseph's Hospital Pediatric Cardiology Program, 1999-2009
 - Includes assisting Dr. James Irwin during the Arctic Front clinical trials (Cryoablation of Pulmonary Veins for Treatment of Paroxysmal AF) at St. Joseph's Hospital, Tampa, FL (2006-2010)
- Coordinated the successful Atrial Fibrillation Cycle I certification of Bayfront Health Dade City in 2014
- State of Florida Board of Nursing approved CE Provider (CE Broker #50-12998)



Wayne Ruppert (L) assisting Dr. James Irwin (R) with Pulmonary Vein Isolation during the Arctic Front clinical trials for Atrial Fibrillation Ablation at St. Joseph's Hospital, Tampa, FL in 2007



JACC

JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY

SEARCH

Advanced Search

[Home](#)

[Current Issue](#)

[All Issues](#)

[Just Accepted](#)

[Online Before Print](#)

[Topic Collections](#)



Volume 61, Issue 16, April 2013 >

Clinical Research: Heart Rhythm Disorders | April 2013

Cryoballoon Ablation of Pulmonary Veins for Paroxysmal Atrial Fibrillation

First Results of the North American Arctic Front (STOP AF) Pivotal Trial

FREE

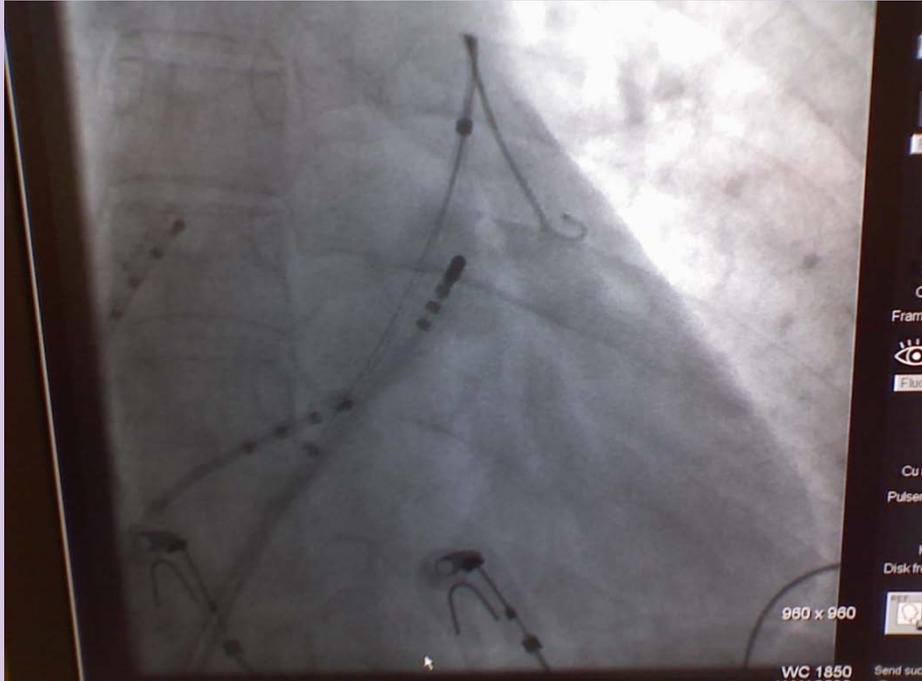
Douglas L. Packer, MD[□]; Robert C. Kowal, MD[†]; Kevin R. Wheelan, MD[†]; **James M. Irwin, MD[†]**;
Jean Champagne, MD[§]; Peter G. Guerra, MD^{||}; Marc Dubuc, MD^{||}; Vivek Reddy, MD^{||};
Linda Nelson, RN[#]; Richard G. Holcomb, PhD^{□□}; John W. Lehmann, MD, MPH^{††}; Jeremy N.
Ruskin, MD^{‡‡}

[\[+\] Author Information](#)

Evidence Based Reference Sources for this presentation:

- [2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation](#)
- [Risk Stratification for Arrhythmic Events in Patients With Asymptomatic Pre-Excitation: A Systematic Review for the 2015 ACC/AHA/HRS Guideline for the Management of Adult Patients With Supraventricular Tachycardia](#)

Other Reference Sources: Electrophysiology (EP) Lab Case Studies



EP Catheters within the heart used for obtaining the Electrogram (the “internal ECG”) Tracing and for Pace-mapping, an integral component of an EP study



Author Wayne Ruppert conducting Pace-mapping during EP study at the St Joseph’s Hospital Heart Institute, Pediatric Electrophysiology Program, Tampa, FL in 2004



Presented by the
Society of
Cardiovascular
Patient Care

May 25-27, 2016

scpc.org/Congress

Initial Evaluation and Early Stabilization: Best Practices for the AF Patient

Wayne Ruppert, CVT, CCCC, NREMT-P



Presented by the
Society of
Cardiovascular
Patient Care

May 25-27, 2016

scpc.org/Congress

Initial Evaluation and Early Stabilization: Best Practices for the AF Patient *and A-Flutter*

Wayne Ruppert, CVT, CCCC, NREMT-P

Why we treat A-fib and A-flutter the same:

Afib and Aflutter share:

- Thrombus risks**
- Rate control issues**
- Etiology and pathophysiology**
- Patients often convert between the two rhythms randomly and frequently**

Why we treat A-fib and A-flutter the same:

Afib and Aflutter share:

- Thrombus risks
- Rate control issues
- Etiology and pathophysiology
- Patients often convert between the two rhythms randomly and frequently
- *Patients are often in Afib and Aflutter CONCURRENTLY . . .*

68 yr
Male Hispanic
Room: VAM
Loc: 3 Option: 23

Vent. rate 85 BPM
PR interval * ms
QRS duration 100 ms
QT/QTc 342/406 ms
P-R-T axes * 58 46

***UNEDITED COPY: REPORT IS COMPUTER GENERATED ONLY, WITHOUT PHYSICIAN INTERPRETATION**.
Atrial fibrillation
Voltage criteria for left ventricular hypertrophy
Abnormal ECG
When compared with ECG of 19-NOV-2006 07:39,
No significant change was found

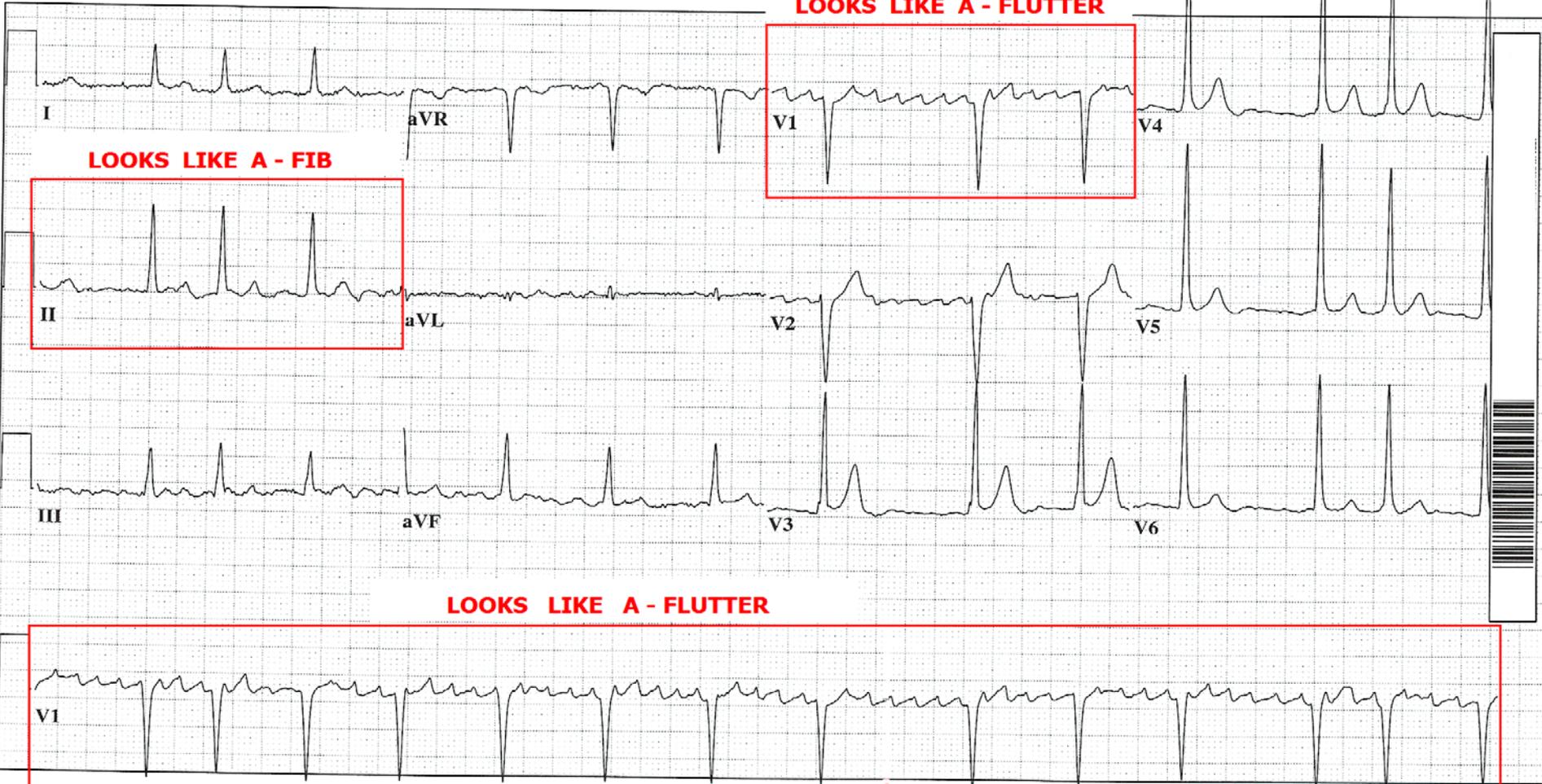
Technician:

Referred by

LOOKS LIKE A - FLUTTER

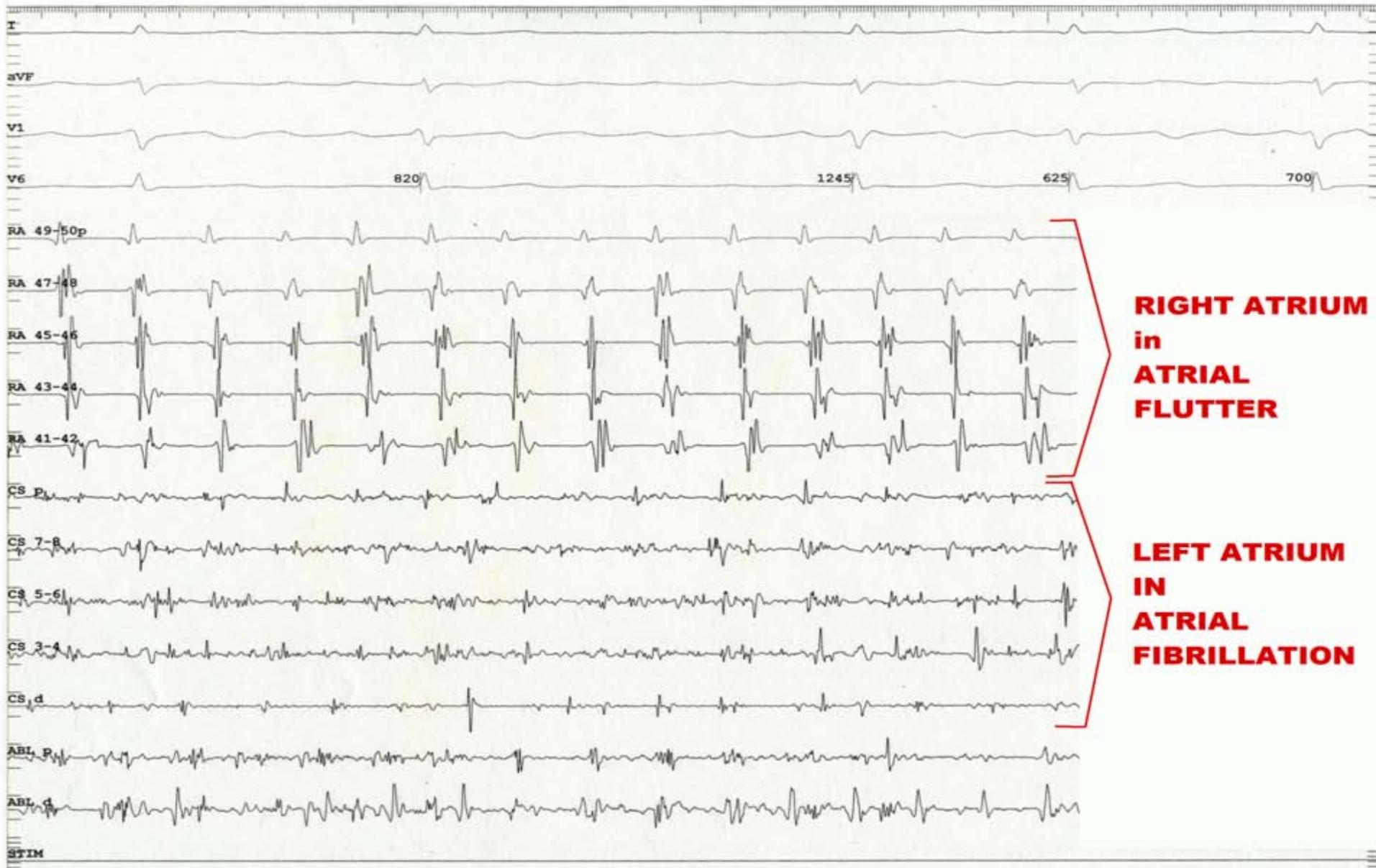
LOOKS LIKE A - FIB

LOOKS LIKE A - FLUTTER



25mm/s 10mm/mV 40Hz 005D 12SL 235 CID: 2

**Concurrent Atrial Fibrillation and Atrial Flutter ("Fib-Flutter") captured on the Electrogram
(the "internal ECG") obtained in the Electrophysiology Lab by Wayne Ruppert in 2006**



**RIGHT ATRIUM
in
ATRIAL
FLUTTER**

**LEFT ATRIUM
IN
ATRIAL
FIBRILLATION**

Patient Evaluation

Initial Assessment:

SHOCK ASSESSMENT



SECONDS

SHOCK =

INADEQUATE TISSUE
PERFUSION

- STARTS THE INSTANT YOU SEE PATIENT
- ENDS WHEN YOU REACH THE PATIENT'S SIDE

SHOCK ASSESSMENT

LOC:	ANXIOUS RESTLESS LETHARGIC UNCONSCIOUS	AWAKE ALERT & ORIENTED
SKIN:	PALE / ASHEN CYANOTIC COOL DIAPHORETIC	NORMAL HUE WARM DRY
BREATHING:	TACHYPNEA	NORMAL
PULSE:	WEAK / THREADY TOO FAST or SLOW	STRONG
STATUS:	 SHOCK 	NORMAL

Shock: Etiology

- Shock may be REVERSIBLE if it is discovered in time, the UNDERLYING CAUSE identified and treated rapidly.
- Shock; common etiology:
 - Cardiogenic (e.g: Acute MI, Dysrhythmia, HF)
 - Insulin Shock (e.g: critically low blood sugar)
 - Hypovolemia (internal or external blood loss)
 - Obstructive (e.g: Pulmonary Embolus)
 - Distributive (e.g: Septic shock)

Patient presents with any of the following:

- ACS SYMPTOMS (typical or atypical)**
- SHOCK / Shock-like symptoms (skin pale, clammy, diaphoretic) of CARDIAC or unknown etiology**
- PALPITATIONS / Irregular Heart Rate**
- Appears to be in distress**

Patient presents with any of the following:

- ACS SYMPTOMS (typical or atypical)**
- SHOCK / Shock-like symptoms (skin pale, clammy, diaphoretic) of CARDIAC or unknown etiology**
- PALPITATIONS / Irregular Heart Rate**
- Appears to be in distress**



STAT 12 Lead ECG read by doctor within 10 minutes reveals Atrial Fibrillation or Atrial Flutter is primary ECG abnormality:

Patient presents with any of the following:

- ACS SYMPTOMS (typical or atypical)
- SHOCK / Shock-like symptoms (skin pale, clammy, diaphoretic) of CARDIAC or unknown etiology
- PALPITATIONS / Irregular Heart Rate
- Appears to be in distress

STAT 12 Lead ECG read by doctor within 10 minutes reveals Atrial Fibrillation or Atrial Flutter is primary ECG abnormality:

**ECG = A-Fib / Flutter with RVR
Patient UNSTABLE with RAPID
clinical deterioration ...**

**ECG = A-Fib / Flutter with RVR
Patient is STABLE**

**ECG = A-Fib / Flutter with HR
< 100 Patient is STABLE**

Patient presents with any of the following:

- ACS SYMPTOMS (typical or atypical)
- SHOCK / Shock-like symptoms (skin pale, clammy, diaphoretic) of CARDIAC or unknown etiology
- PALPITATIONS / Irregular Heart Rate
- Appears to be in distress

STAT 12 Lead ECG read by doctor within 10 minutes reveals Atrial Fibrillation or Atrial Flutter is primary ECG abnormality:

**ECG = A-Fib / Flutter with RVR
Patient UNSTABLE with RAPID
clinical deterioration ...**

STAT 12 Lead ECG read by doctor within 10 minutes reveals Atrial Fibrillation or Atrial Flutter is primary ECG abnormality:

ECG = A-Fib / Flutter with RVR
Patient UNSTABLE with RAPID
clinical deterioration ...

**IMMEDIATE Synchronized
Cardioversion (120-200j biphasic)**

Level I B recommendation

To Cardiovert or Not to Cardiovert ?

- Presence of hemodynamic instability (shock) determines initial therapy
- Cardiac reserve present to warrant rate control (preferred) over cardioversion.
- Rate of clinical deterioration
- Duration of AF
- EF (if known)
- Is patient currently anticoagulated?
 - And if YES, is it in the THERAPEUTIC RANGE?

SVT - UNSTABLE PATIENT (NARROW QRS)

ABC s + GENERAL SUPPORTIVE CARE
(OXYGEN, ECG / VS / SAO2 MONITORING, IV ACCESS)

IMMEDIATE SYNCHRONIZED CARディオVERSION

- CONSIDER SEDATION
- SYNCHRONIZED CARディオVERSION

REGULAR RHYTHM:

50 - 100 j biphasic

----- monophasic = 200 j -----

IRREGULAR RHYTHM:

120 - 200 j biphasic



WIDE COMPLEX TACHYCARDIA

(QRS > 120 ms)

MONOPHASIC

ABCs

NO PULSE

GO TO
V-FIB
ALGORITHM!

PULSE - UNSTABLE

- IMMEDIATE SYNC. CARDIOVERSION:
 - 120 j biphasic
 - consider sedation
- INCREASE joules
- MEDS:
 - PROCAINAMIDE
 - ~~AMIODARONE~~

PULSE - STABLE

- O₂, IV-IO, EKG
- ~~PROCAINAMIDE~~
(only if REGULAR)
- PROCAINAMIDE
(20-50mg/min)
- ~~AMIODARONE~~
(150 over 10min +
1mg/min INFUSION)



If Initial Cardioversion Not Successful:

- Consider repositioning pads
 - Anterior / Posterior placement
 - Change polarity (reverse pad locations)
- Increase energy (joules)
- If monophasic current delivery used, try biphasic
- Apply pressure to anterior pad
- Use a drug such as ibutilide to lower the defibrillation threshold.

Class II a LOE C

Post Emergency Cardioversion; Anticoagulation strategy determinants:

- **Duration of Atrial Fibrillation/Flutter**
 - Less than 48 hours
 - 48 hours or more
- **CHA₂DS₂-VASc Stroke Risk Score**
 - Low risk: scores of 0 – 1
 - High risk: scores of 2 or more

Selection of antithrombotic therapy should be based on the risk of thromboembolism irrespective of whether the AF pattern is paroxysmal, persistent, or permanent

CLASS I LOE B

In patients with nonvalvular AF, the CHA₂DS₂-VASc score is recommended for assessment of stroke risk.

CLASS I LOE B

Thromboembolic Event Risk Stratification

CHA2DS2 - VASc Score

Score Calculation:

- 1 Congestive Heart Failure
- 1 Hypertension
- 1 Age 65 - 74
- 2 Age 75 or greater
- 1 Diabetes
- 2 Stroke / TIA *
- 1 Vascular Disease
- 1 Gender - Female

TOTAL Points

CHA2DS2 - VASc Score

Score Interpretation:

Total Points:

0 = Low Risk: Antithrombotic therapy may be omitted (Class IIa, LOE: B)

1 = Intermediate Risk: Non-valvular AF, Aspirin or oral anticoagulation is reasonable (Class IIa, LOE: B)

2 or more = High Risk: Oral Anticoagulation recommended ^{1, 2, 3}
(Class I, LOE: B)

Post Emergency Cardioversion;

Anticoagulation strategy:

- AF/AFL duration < 48 hours,
- Low Stroke Risk (CHA₂DS₂-VASc Score: 0):

anticoagulation (intravenous heparin, LMWH, or a new oral anticoagulant) or **no**

antithrombotic therapy may be considered for cardioversion, without the need for post cardioversion oral anticoagulation

CLASS II b, LOE 3

Post Emergency Cardioversion; Anticoagulation Strategy:

- AF/AFL Duration <48 hours, but patient has high risk of stroke (CHA₂DS₂-VASc Stroke Risk Score 2 or more):
- AF/AFL Duration 48 hours or more (all patients):

anticoagulation should be initiated as soon as possible and continued for at least 4 weeks after cardioversion unless contraindicated.

CLASS I, LOE C

17 year old male. Acute onset "heart racing," unstable



CHARACTERISTICS of W-P-W with Afib & RVR:

- **WIDE COMPLEX TACHYCARDIA**
- **IRREGULARLY IRREGULAR R – R INTERVALS !!**



17 year old male. Acute onset. CHA₂DS₂-VASc Score = 0
Need for anticoagulation ?



78 y/o male, acute onset shortness of breath. History of AMI, CHF, Hypertension, CVA, Diabetes, PVD Hemodynamically unstable

78 yr
Male Caucasian

Vent. rate	178	BPM
PR interval	*	ms
QRS duration	90	ms
QT/QTc	264/454	ms
P-R-T axes	* -19	46

Loc:3 Option:23

**UNEDITED COPY – REPORT IS COMPUTER GENERATED ONLY, WITHOUT PHYSICIAN INTERPRETATION

Atrial fibrillation with rapid ventricular response
with premature ventricular or aberrantly conducted complexes
Nonspecific ST abnormality , probably digitalis effect
Abnormal ECG

Referred by: _____ Confirmed By: UNEDITED DR. _____



78 y/o male.

CHA₂DS₂-VASc Score = 7 Need for anticoagulation ?

78 yr
Male Caucasian

Vent. rate	178	BPM
PR interval	*	ms
QRS duration	90	ms
QT/QTc	264/454	ms
P-R-T axes	* -19	46

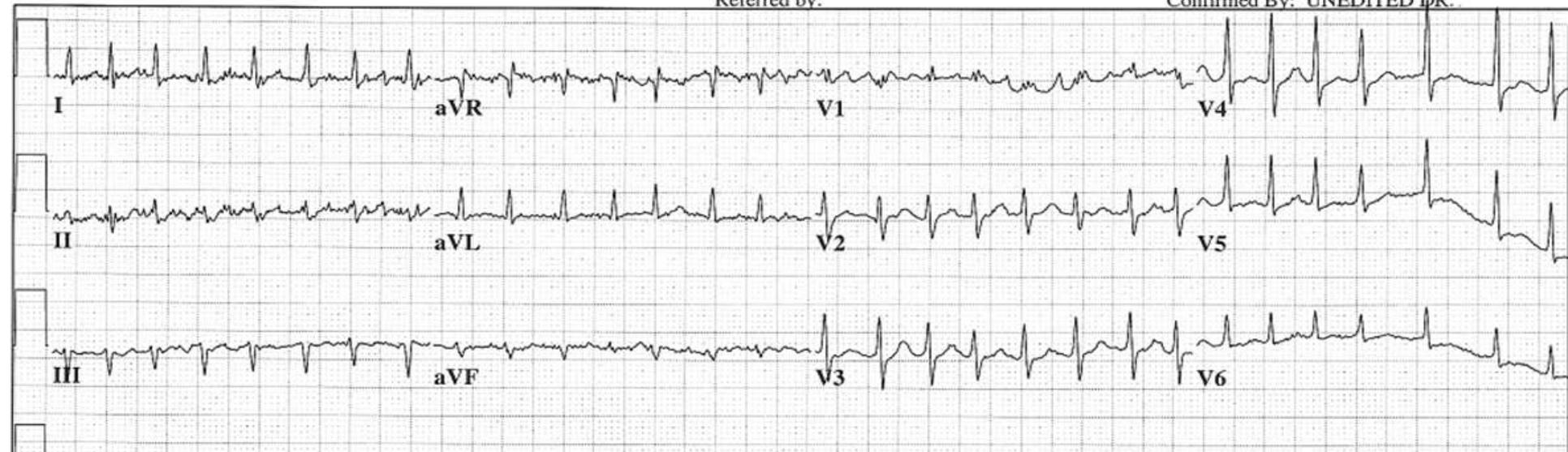
Loc:3 Option:23

**UNEDITED COPY – REPORT IS COMPUTER GENERATED ONLY, WITHOUT PHYSICIAN INTERPRETATION

Atrial fibrillation with rapid ventricular response
with premature ventricular or aberrantly conducted complexes
Nonspecific ST abnormality , probably digitalis effect
Abnormal ECG

Referred by:

Confirmed By: UNEDITED DR.



78 y/o male, History of AMI, CHF, Hypertension, CVA, Diabetes, PVD

78 yr
Male Caucasian

Vent. rate	178	BPM
PR interval	*	ms
QRS duration	90	ms
QT/QTc	264/454	ms
P-R-T axes	* -19	46

Loc:3 Option:23

**UNEDITED COPY – REPORT IS COMPUTER GENERATED ONLY, WITHOUT PHYSICIAN INTERPRETATION

Atrial fibrillation with rapid ventricular response
with premature ventricular or aberrantly conducted complexes
Nonspecific ST abnormality , probably digitalis effect
Abnormal ECG

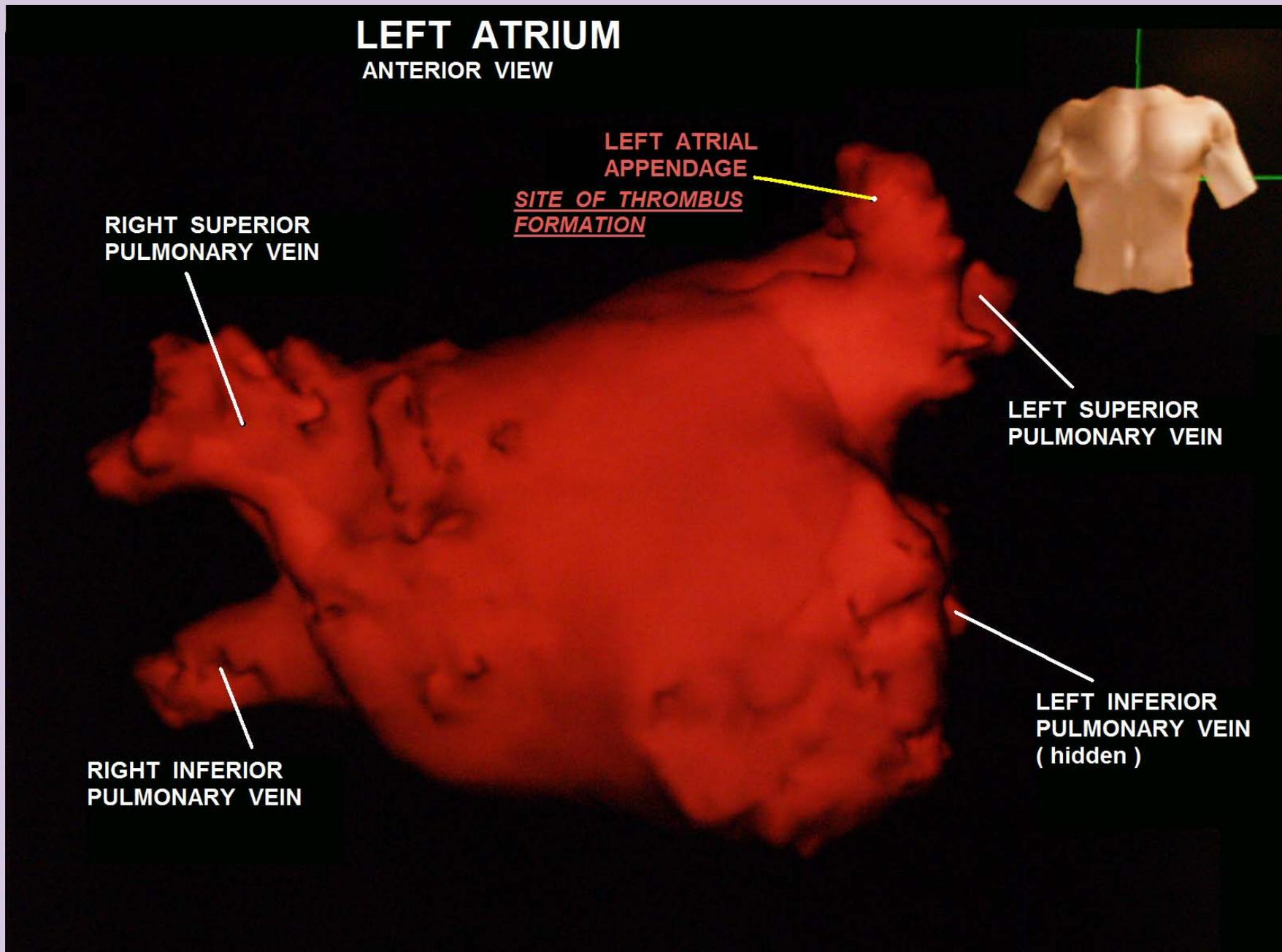
Referred by:

Confirmed By: UNEDITED DR.

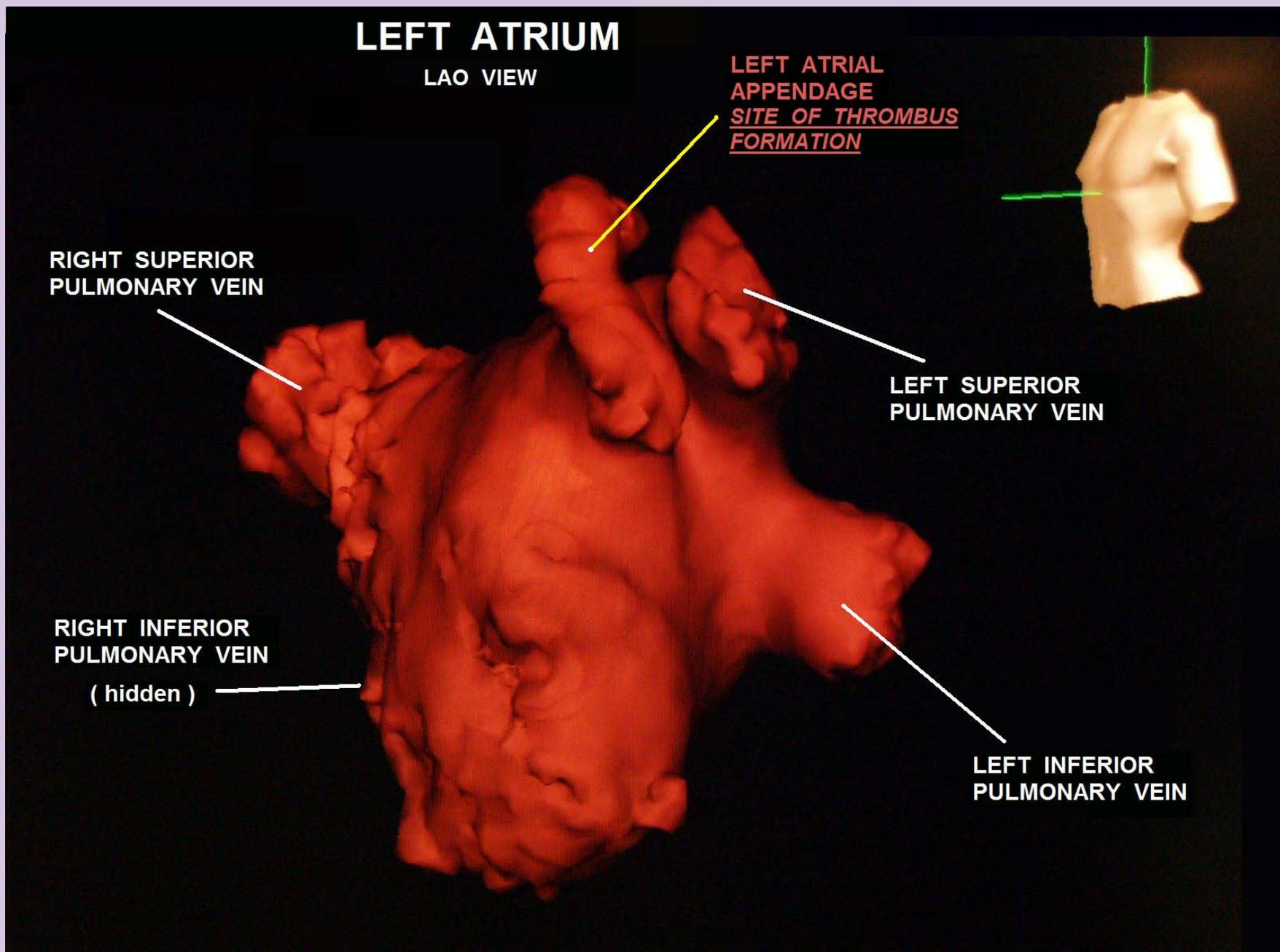


Post-cardioversion: Consider patient's current antithrombotic medications, obtain PT/PTT/INR, *initiate and continue anticoagulation therapy for at least 4 weeks.*

Left Atrial Appendage: site of THROMBUS FORMATION in AF/ AFL



Left Atrial Appendage: site of THROMBUS FORMATION in AF/ AFL



Patient presents with any of the following:

- ACS SYMPTOMS (typical or atypical)
- SHOCK / Shock-like symptoms (skin pale, clammy, diaphoretic) of CARDIAC or unknown etiology
- PALPITATIONS / Irregular Heart Rate
- Appears to be in distress

STAT 12 Lead ECG read by doctor within 10 minutes reveals Atrial Fibrillation or Atrial Flutter is primary ECG abnormality:

**ECG = A-Fib / Flutter with RVR
Patient UNSTABLE with RAPID
clinical deterioration . . .**

**ECG = A-Fib / Flutter with RVR
Patient is STABLE**

**ECG = A-Fib / Flutter with HR
< 100 Patient is STABLE**

Patient presents with any of the following:

- ACS SYMPTOMS (typical or atypical)
- SHOCK / Shock-like symptoms (skin pale, clammy, diaphoretic) of CARDIAC or unknown etiology
- PALPITATIONS / Irregular Heart Rate
- Appears to be in distress



STAT 12 Lead ECG read by doctor within 10 minutes reveals Atrial Fibrillation or Atrial Flutter is primary ECG abnormality:



**ECG = A-Fib / Flutter with RVR
Patient is STABLE**

AF / AFL with Ventricular Rate >100 Patient is Hemodynamically Stable

- For patients with AF/AFL who are hemodynamically stable, the primary objectives are:
 - Maintain Ventricular Heart Rate at an acceptable rate, preferably <80, but can be between 80-110 for patients who are asymptomatic and have preserved left ventricular function. **(Class II b LOE B)**
 - Rule out thrombus in the Left Atrium and Left Atrial Appendage PRIOR TO restoring sinus rhythm.

AF / AFL with Ventricular Rate >100 Patient is Hemodynamically Stable

- **Rate control strategy**

- **QRS Complexes Narrow (<120 ms), no Delta waves present:**

- IV administration of a **beta blocker** or non-dihydropyridine **calcium channel blocker** is recommended to slow the ventricular heart rate in the acute setting in patients without pre-excitation.

Class I, LOE B

AF / AFL with Ventricular Rate >100

Patient is Hemodynamically Stable

- **Rate control strategy**
 - **QRS Complexes Narrow (<120 ms), no Delta waves present:**

Typical first-line rate control IV meds:

 - **Cardizem, Diltiazem** (bolus + maintenance drip)
 - **Esmolol, Propranolol and Metoprolol**

Class I, LOE B

AF / AFL with Ventricular Rate >100

Patient is Hemodynamically Stable

- **Rate control strategy**
 - **QRS Complexes Narrow (<120 ms), no Delta waves present when HEART FAILURE is also present:**
 - **Carvedilol**

AF / AFL with Ventricular Rate >100

Patient is Hemodynamically Stable

- **Assess Stroke Risk** using CHA₂DS₂-VASc score.
- **Formulate and implement ANTICOAGULATION STRATEGY**, if indicated.
- **Conversion to Sinus Rhythm** should occur as soon as possible, but **only AFTER** the patient's Stroke Risk Assessment has been completed, and any indicated Anticoagulation has occurred, and/or thrombus has been ruled out in the Left Atrium and Left Atrial Appendage by Transesophageal Echocardiogram (TEE).

Anticoagulation Strategy

- Based on the patient's CHA₂DS₂-VASc score, the following anticoagulation strategy should be implemented:
 - **Score = 0**, it is reasonable to omit antithrombotic therapy. (*Class II a, Level of Evidence: B*)
 - **Score = 1**, no antithrombotic therapy or treatment with an oral anticoagulant or aspirin may be considered. (*Class II b, Level of Evidence: C*)
 - **Score = 2 or more:** oral anticoagulation is recommended, as outlined on the next page . . .

Anticoagulation Strategy; High Risk of Stroke:

CHA₂DS₂-VASc score of 2 or greater, or prior stroke, transient ischemic attack (TIA), the following oral anticoagulants are recommended.

CLASS I Recommended Options include:

Warfarin (INR 2.0 to 3.0)	<i>(Level of Evidence: A)</i>
Dabigatran	<i>(Level of Evidence: B)</i>
Rivaroxaban	<i>(Level of Evidence: B)</i>
Apixaban	<i>(Level of Evidence: B)</i>

Anticoagulation Strategy; High Risk of Stroke:

CLASS I Recommendation

Warfarin Therapy:

- INR should be determined at least weekly during initiation of antithrombotic therapy**
- and at least monthly when anticoagulation (INR in range) is stable**

- *(Level of Evidence: A)*

Anticoagulation Strategy; High Risk of Stroke:

CLASS I Recommendation

For patients with nonvalvular AF unable to maintain a therapeutic INR level with warfarin, use of a direct thrombin or factor Xa inhibitor (dabigatran, rivaroxaban, or apixaban) is recommended.

- *(Level of Evidence: C)*

Anticoagulation Strategy; High Risk of Stroke:

CLASS I Recommendation

Renal function should be evaluated before initiation of direct thrombin or factor Xa inhibitors and should be reevaluated when clinically indicated and at least annually.

- *(Level of Evidence: B)*

Anticoagulation Strategy; High Risk of Stroke:

CLASS I Recommendation

For patients with nonvalvular AF with a **CHA₂DS₂-VASc score of 2 or greater** and who have **end-stage chronic kidney disease (CKD)** (creatinine clearance <15 mL/min) or are on hemodialysis, it is reasonable to prescribe warfarin (INR 2.0 to 3.0) for oral anticoagulation.

- *(Level of Evidence: B)*

Anticoagulation Strategy; High Risk of Stroke:

Statement from AHA/ACC/HRS 2014 AF Guideline:

For patients with CKD, dose modifications of the new agents are available; however, for those with severe or end-stage CKD, warfarin remains the anticoagulant of choice, as there are no or very limited data for these patients. Among patients on hemodialysis, warfarin has been used with acceptable risks of hemorrhage

Anticoagulation Strategy; High Risk of Stroke:

CLASS II b Recommendation

For patients with nonvalvular AF and moderate-to-severe CKD with CHA₂DS₂-VASc scores of 2 or greater, treatment with reduced doses of direct thrombin or factor Xa inhibitors may be considered (e.g., dabigatran, rivaroxaban, or apixaban), but safety and efficacy have not been established.

- *(Level of Evidence: C)*

Anticoagulation Strategy; High Risk of Stroke:

CLASS III Harm

The direct thrombin inhibitor dabigatran should not be used in patients with AF and a mechanical heart valve.

- *(Level of Evidence: B)*

Rate Control Strategy; Considerations:

CLASS III Harm (CONTRAINDICATION):

Dronedarone should not be used to control the ventricular rate in patients with permanent AF as it increases the risk of the combined endpoint of stroke, myocardial infarction, systemic embolism, or cardiovascular death.

- *(Level of Evidence: B)*

SPECIAL CONSIDERATIONS:

- For patients with AF who have mechanical heart valves, warfarin is recommended, and the target international normalized ratio (INR) intensity (2.0 to 3.0 or 2.5 to 3.5) should be based on the type and location of the prosthesis

(Level of Evidence: B)

Non-Emergency Cardioversion:

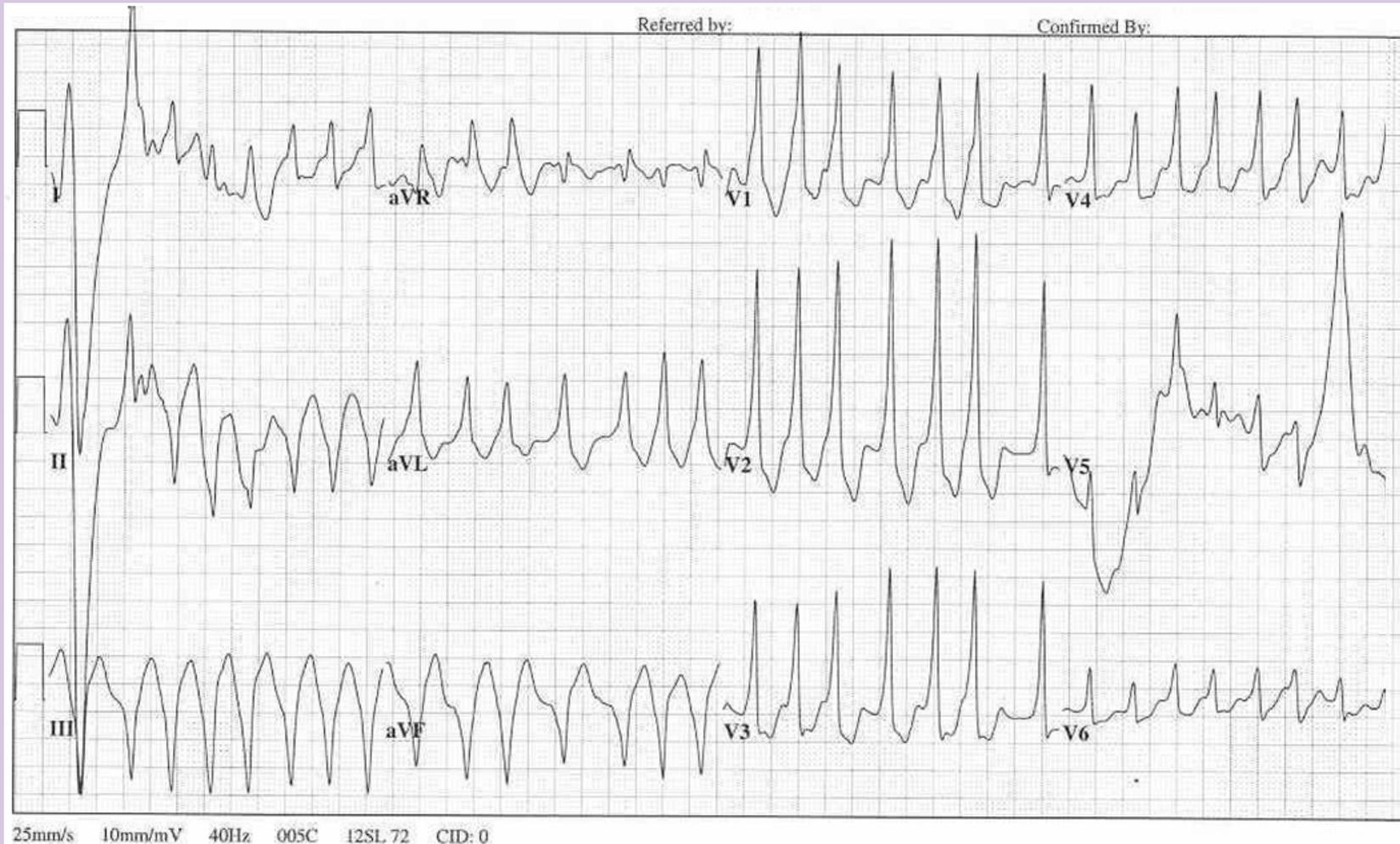
CLASS I Recommendation:

Cardioversion is recommended when a rapid ventricular response to AF or atrial flutter does not respond promptly to pharmacological therapies and contributes to ongoing myocardial ischemia, hypotension, or HF.

(Level of Evidence: C)

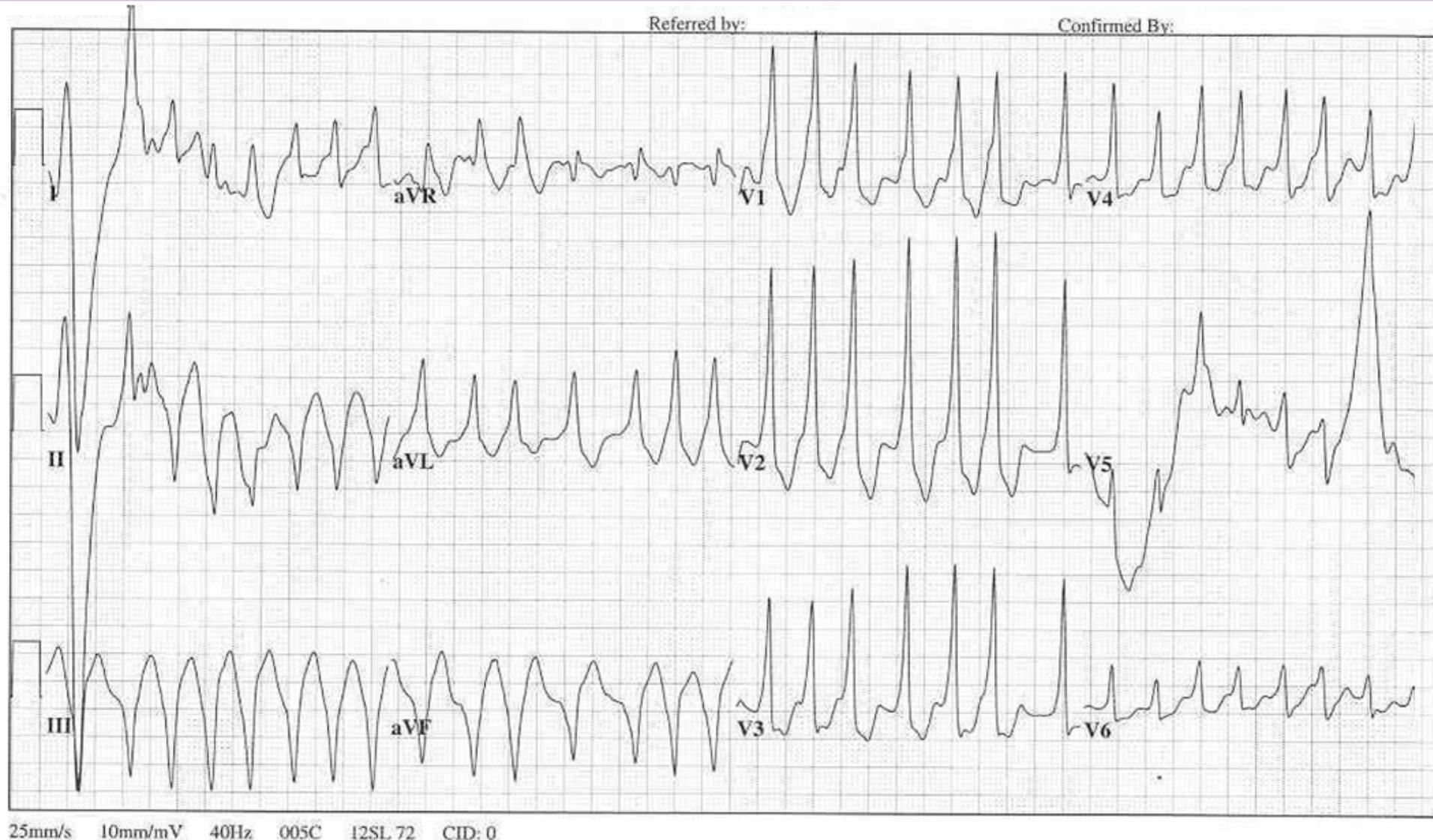
What would be your rate control strategy for this patient?

37 y/o male, alert, oriented, hemodynamically stable
Heart rate 170, no previously known cardiac history



CHARACTERISTICS of W-P-W with Afib & RVR:

- **WIDE COMPLEX TACHYCARDIA**
- **IRREGULARLY IRREGULAR R – R INTERVALS !!**



In this case, the ER physician ordered a Diltiazem bolus and maintenance infusion.

During the bolus infusion of Diltiazem, the patient's heart rhythm converted to Ventricular Fibrillation.

He was successfully defibrillated and the Diltiazem was immediately discontinued.

Post Defibrillation ECG: small Delta waves are visible

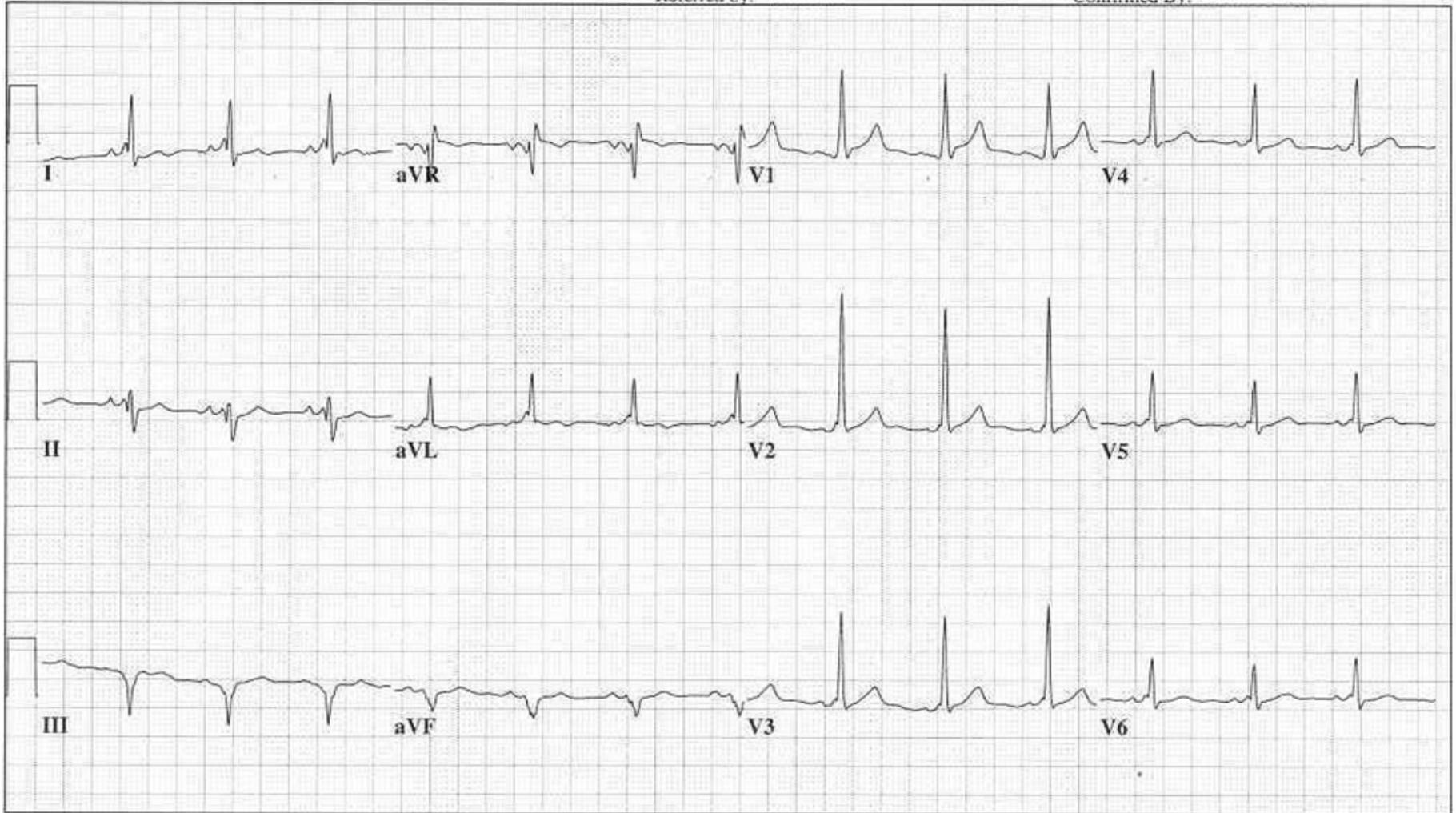
37 yr
Male Caucasian
Room:OP
Loc:8 Option:19

Vent. rate 82 BPM
PR interval 132 ms
QRS duration 128 ms
QT/QTc 392/458 ms
P-R-T axes 77 -44 154

Normal sinus rhythm
Ventricular pre-excitation, WPW pattern type A
Abnormal ECG

Referred by:

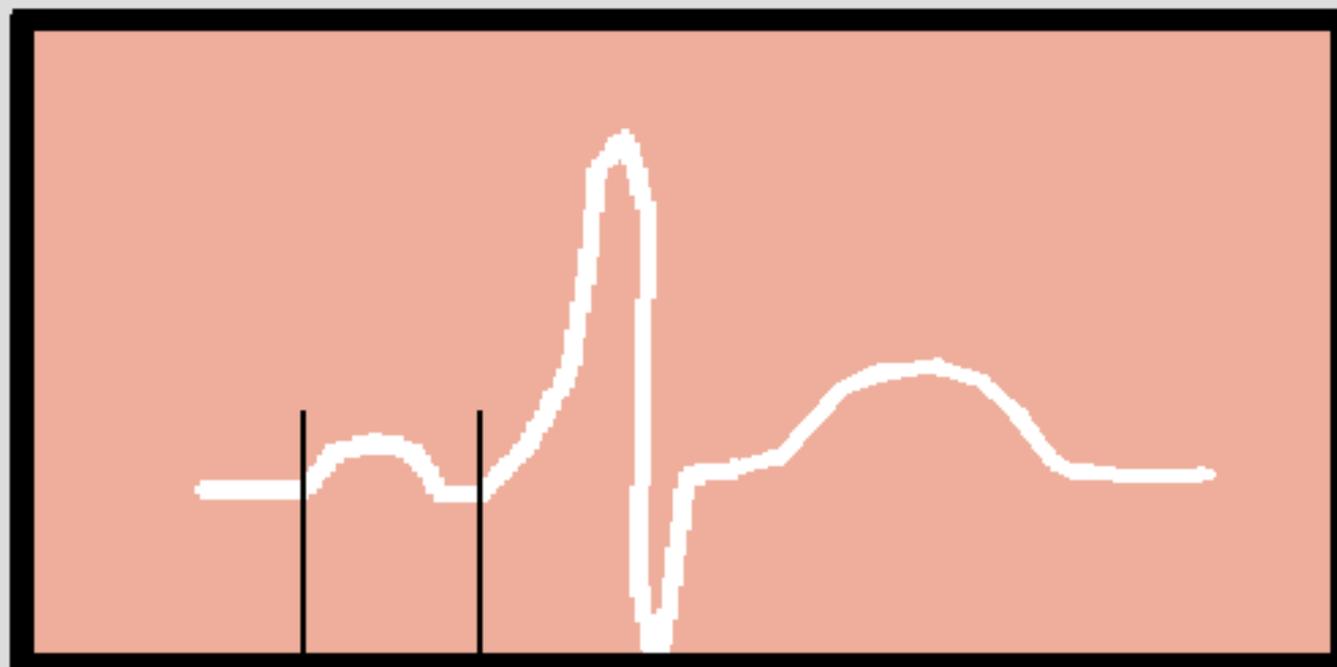
Confirmed By:



25mm/s 10mm/mV 40Hz 005C 12SL 78 CID: 0

WOLFF-PARKINSON-WHITE

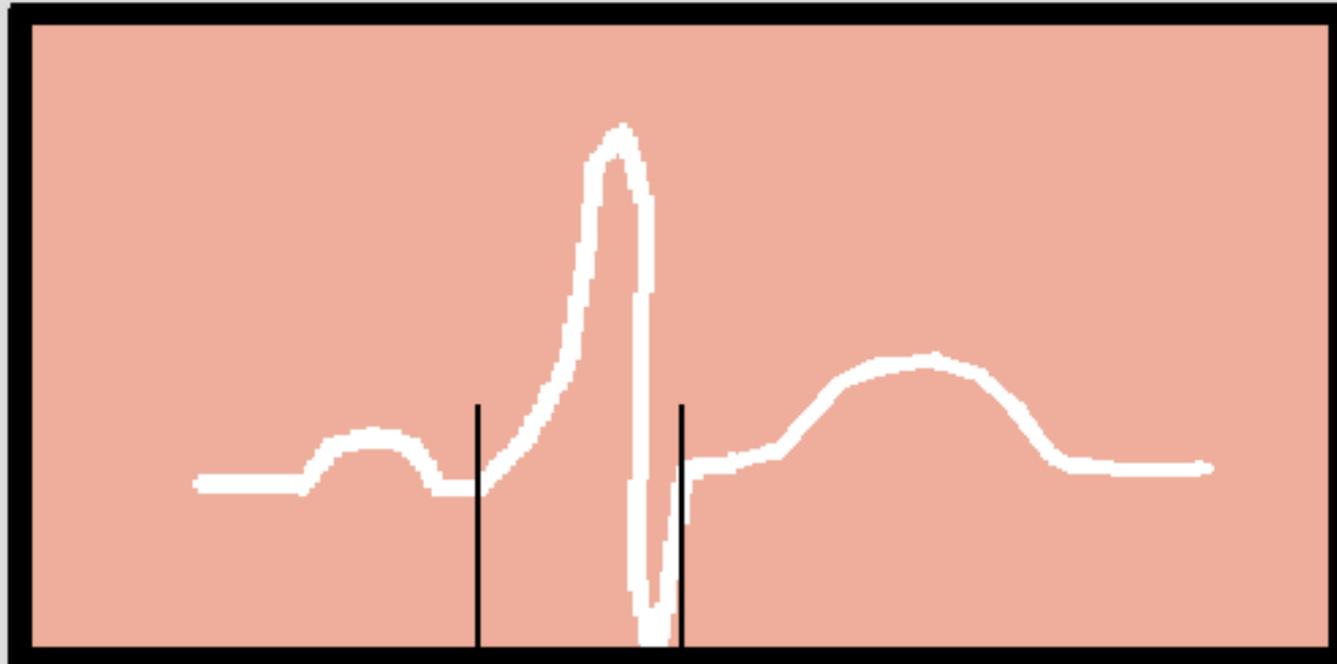
EKG CHARACTERISTICS



SHORTENED
P-R INTERVAL

WOLFF-PARKINSON-WHITE

EKG CHARACTERISTICS



WIDENED
QRS COMPLEX

WOLFF-PARKINSON-WHITE

EKG CHARACTERISTICS



DELTA
WAVE



Be aware that in cases of Wolff-Parkinson-White with Atrial Fibrillation and Rapid Ventricular Response, you may not be able to discern the presence of DELTA WAVES. Therefore whenever a patient presents with any WIDE QRS COMPLEX TACHYCARDIA with IRREGULARLY IRREGULAR R-R intervals, WPW + AF and RVR should ALWAYS be considered.



BEWARE: This is W-P-W with AF / RVR . . . And Delta Waves are not overtly visible !! Suspect W-P-W with AF/RVR whenever an ECG presents with WIDE QRS COMPLEXES with IRREGULARLY IRREGULAR R-R INTERVALS !!!

Valvular disorders (eg Mitral Prolapse) can cause WPW and LAH which leads to Afib.

However the WPW alone can cause Afib.

Therefore AF and WPW are frequently seen together.

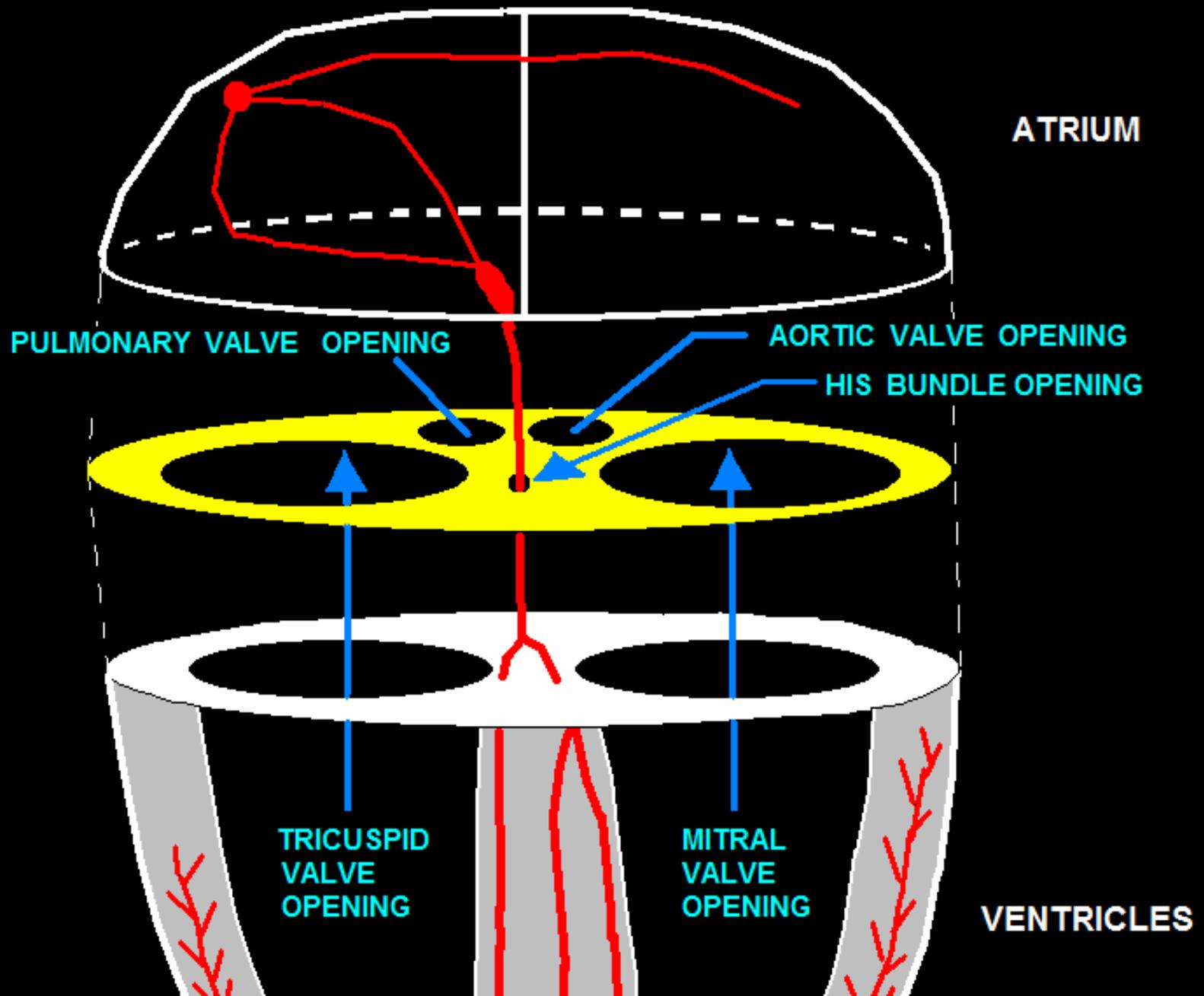
AF atrial rate 300-600. Normally AV node decrements and protects Ventricular rate.

In WPW, the bypass tract does not decrement (“filter” ventricular rate)

And . . . To compound matters, with structural valvular dysfunction, the AF is less tolerated.

THE "SKELETON OF THE HEART"

**FIBROUS
"SKELETON
of the
HEART"**

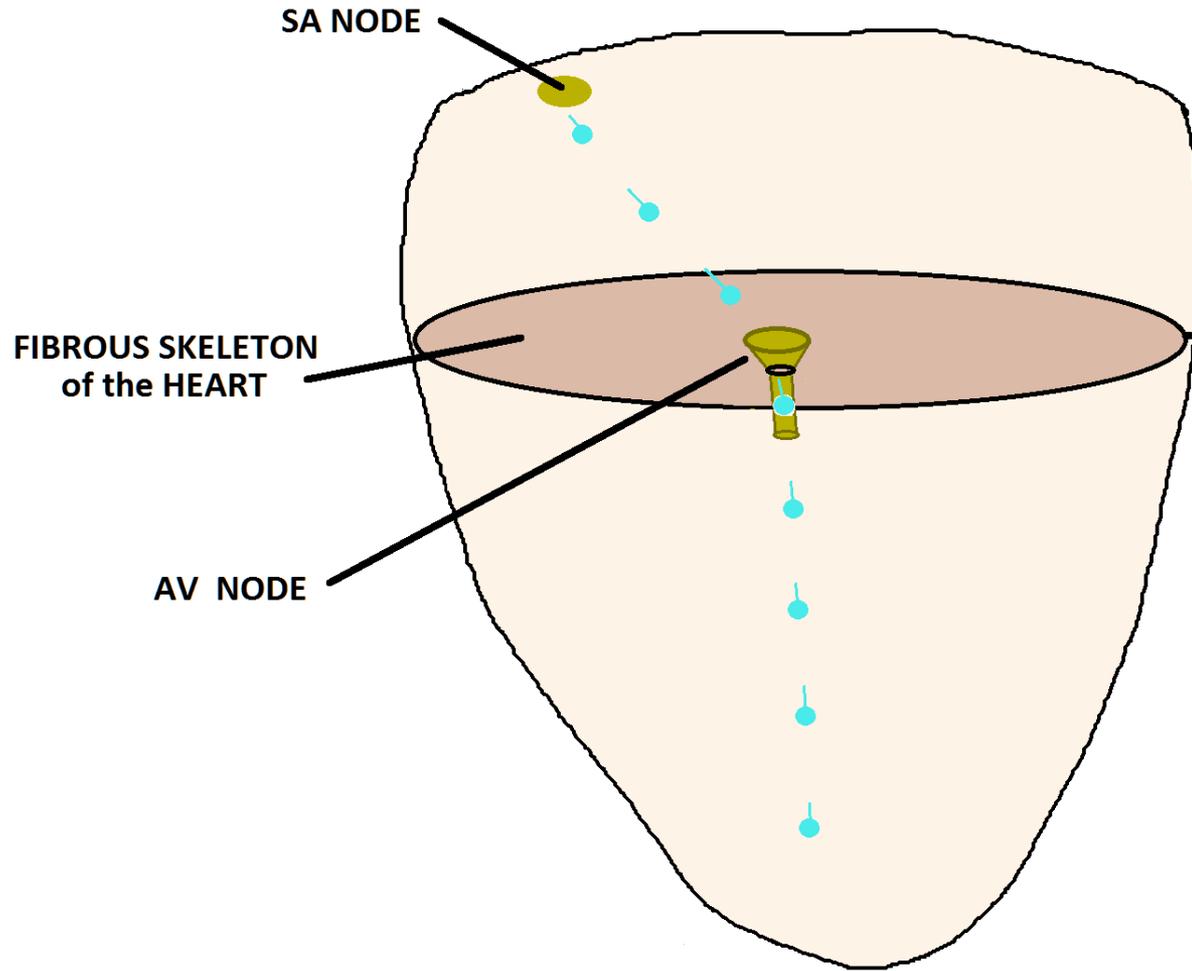


In reference to the previous slide (“The Skeleton of the Heart”), when patients have an abnormal “hole” in the fibrous skeleton of the heart, the electrical energy associated with DEPOLARIZATION “leaks through” to the ventricles, usually preceding the wave of depolarization traversing via the normal conduction system. This abnormal “hole” is the bypass tract associated with the Wolff-Parkinson-White syndrome.

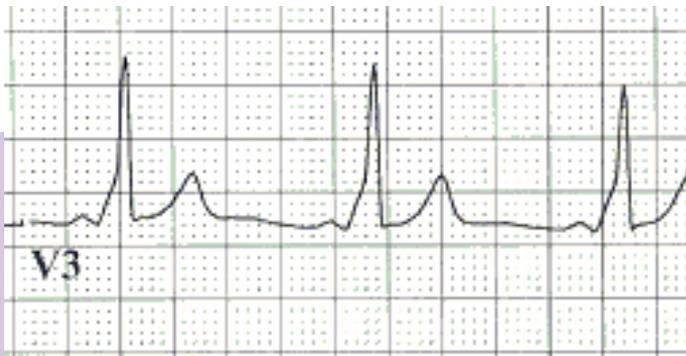
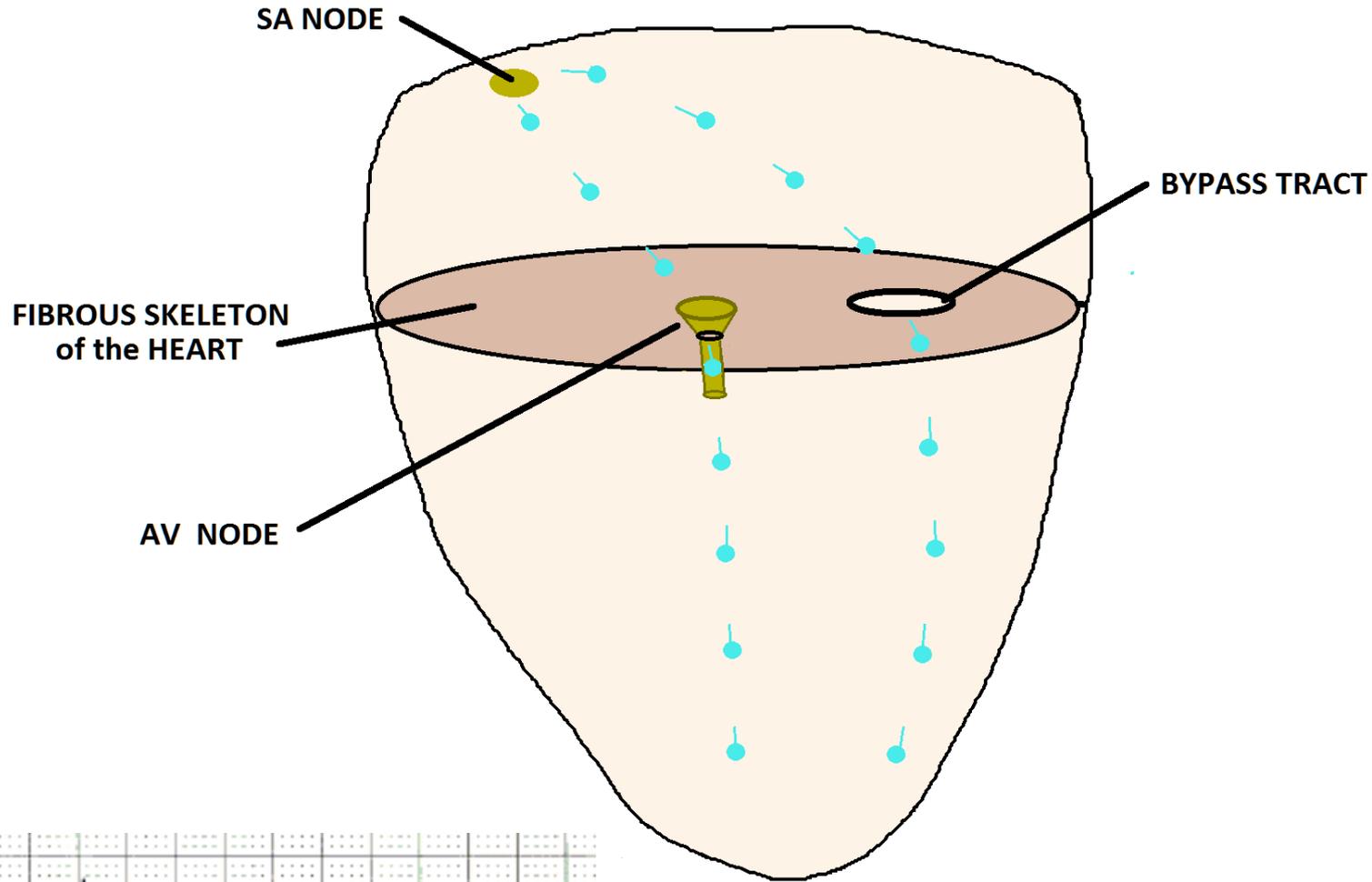
The following slides are a visual depiction of the Atrio-Ventricular conduction of patients with:

- Normal Sinus Rhythm (NSR)
- NSR with Wolff-Parkinson-White (WPW)
- Atrial Fibrillation (AF)
- WPW with AF and Rapid Ventricular Response (RVR)
- WPW with AF/ RVR when AV Nodal Conduction is negated by administration of an AV nodal blocking agent.

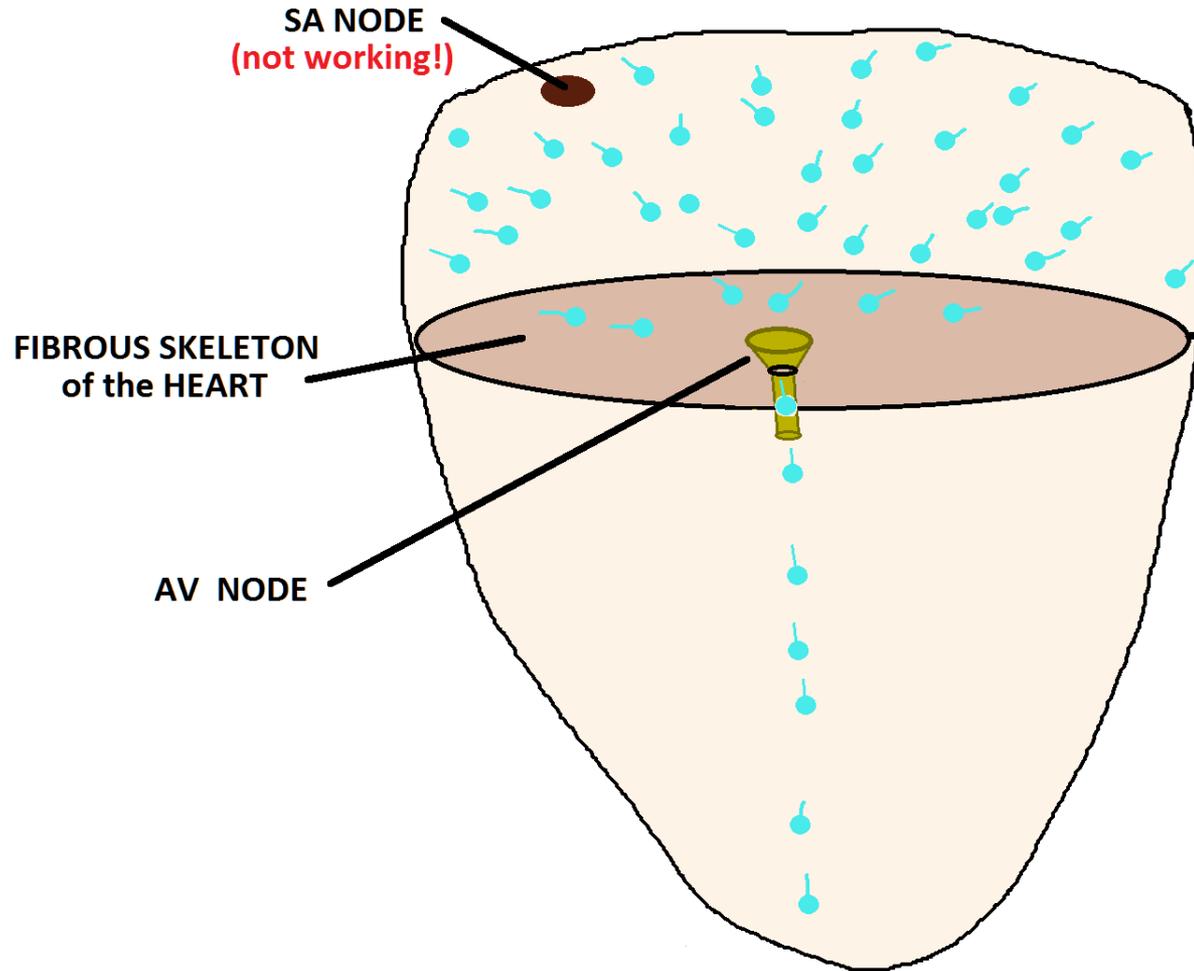
Normal Sinus Rhythm



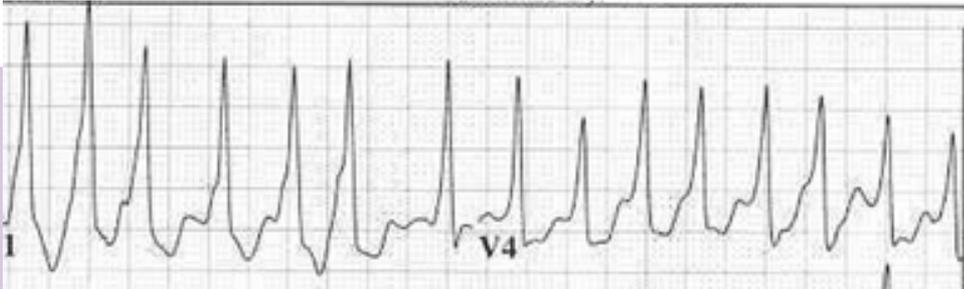
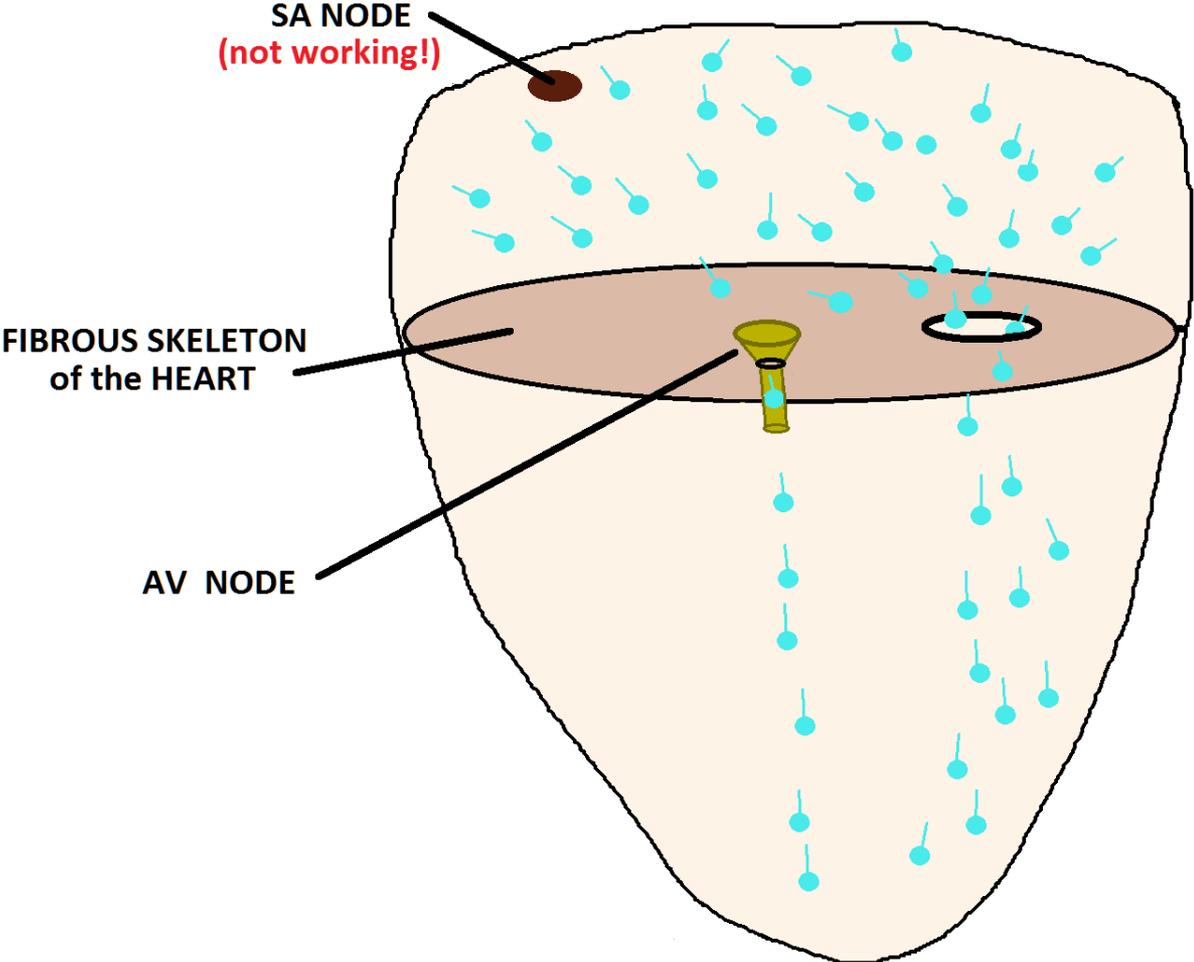
Normal Sinus Rhythm with Wolff-Parkinson White



Atrial Fibrillation



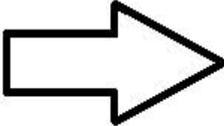
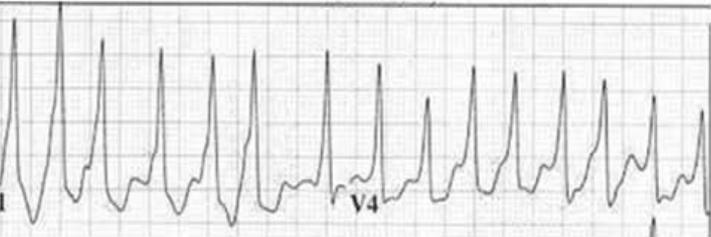
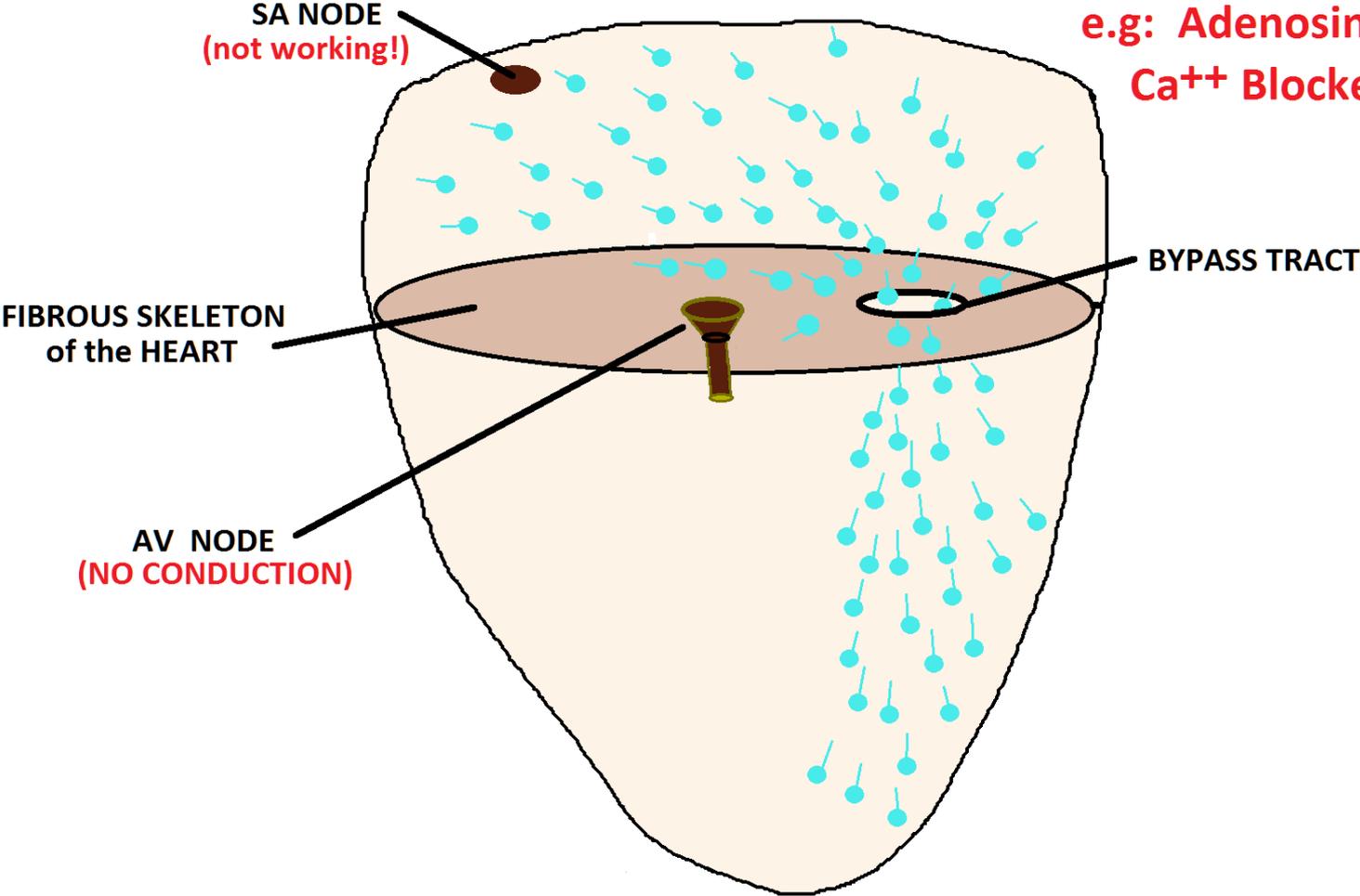
Atrial Fibrillation with Wolff-Parkinson White



Atrial Fibrillation with Wolff-Parkinson White

with AV NODAL BLOCKING AGENTS

e.g: Adenosine,
Ca⁺⁺ Blockers



AF / AFL with Ventricular Rate >100 Patient is Hemodynamically Stable

- **Rate control strategy**
 - **QRS Complexes Wide. If Delta waves are present or if unable to rule out pre-excitation:**

Administration of intravenous amiodarone, adenosine, digoxin (oral or intravenous), or nondihydropyridine calcium channel antagonists (oral or intravenous) in patients with Wolff-Parkinson-White syndrome who have pre-excited AF is potentially harmful because these drugs accelerate the ventricular rate and are known to precipitate VENTRICULAR FIBRILLATION

Class III (harm), LOE B

WIDE COMPLEX TACHYCARDIA

(QRS > 120 ms)

MONOPHASIC

ABCs

NO PULSE

GO TO
V-FIB
ALGORITHM!

PULSE - UNSTABLE

- IMMEDIATE SYNC. CARDIOVERSION:
 - 120 j biphasic
 - consider sedation
- INCREASE joules
- MEDS:
 - PROCAINAMIDE
 - ~~AMIODARONE~~

PULSE - STABLE

- O2, IV-IO, EKG
- MEDS:
 - ~~ADENOSINE 6-12 (only if BENIGN)~~
 - PROCAINAMIDE (20-50mg/min)
 - ~~AMIODARONE (150 mg)~~
 - ILBUTILIDE

AF / AFL with Ventricular Rate >100 Patient is Hemodynamically Stable

- **Rate control strategy**

- **QRS Complexes Wide (>120ms). If Delta waves are present or if unable to rule out pre-excitation:**

Intravenous **procainamide** or **ibutilide** to restore sinus rhythm or slow the ventricular rate is recommended for patients with pre-excited AF and rapid ventricular response who are not hemodynamically compromised .

Class I, LOE C

Consider Reversible Causes:

2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation

“A number of acute noncardiac conditions are associated with AF. Management of the underlying condition and correction of contributing factors as first-line treatment is common to all of these scenarios”

Consider Reversible Causes:

- Hypotension/Hypovolemia
- Hypertension
- Hyperthyroidism
- AMI / CAD / Pericarditis
- Electrolyte imbalances
- Hypothermia
- Acute Alcohol / Drug toxicity
- Electrocution
- Pulmonary Embolus
- Recent Chest Surgery

REVERSIBLE CAUSES CASE STUDY!

Patient: 53 Year old Female

Chief Complaint: "Weakness and Dizziness x 3 days"

History of Present Illness: The patient presents to the ER complaining of feeling weak and unusually tired for the last few days. Today she states she is dizzy, nauseous, and nearly passed out when she stood up. She also states she's had black, tarry stools for the last few days. She denies having any pain; specifically denies chest pain or discomfort, and denies back pain, as well as abdominal pain or cramping.

Past Medical History: Perforated Ulcer

Cardiac Risk Factors: Cigarette smoker, 1.5 – 2 packs/day x 20 years, Family history CAD

Vital Signs: BP: 84/56 Pulse: 184, Irregular Resp Rate: 24 SAO2: 91% room air

Physical Exam: Cool, pale, diaphoretic skin. She is mildly anxious. Alert and oriented to person, place, time and event.

- Pupils PERL, Trachea midline, No JVD,
- Respiratory: clear, all fields; normal chest wall motion, no use of accessory muscles
- Abdomen: soft, non-tender all quadrants
- Extremities: normal sensation, motor function, coordination x 4. No ankle edema. Capillary refill <2 seconds.

ECG: See attached copy.

Abnormal Labs: Hemoglobin: 8.8, Hematocrit: 26.3 RBCs: 3.50 Troponin: 0.42
BUN: 44 Creatinine: 1.5 BUN/Creatinine Ratio: 29.3

REVERSIBLE CAUSES CASE STUDY!

Patient: 53 Year old Female

Chief Complaint: "Weakness and Dizziness x 3 days"

History of Present Illness: The patient presents to the ER complaining of feeling weak and unusually tired for the last few days. Today she states she is dizzy, nauseous, and nearly passed out when she stood up. She also states she's had black, tarry stools for the last few days. She denies having any pain; specifically denies chest pain or discomfort, and denies back pain, as well as abdominal pain or cramping.

Past Medical History: Perforated Ulcer

Cardiac Risk Factors: Cigarette smoker, 1.5 – 2 packs/day x 20 years, Family history CAD

Vital Signs: BP: 84/56 Pulse: 184, Irregular Resp Rate: 24 SAO2: 91% room air

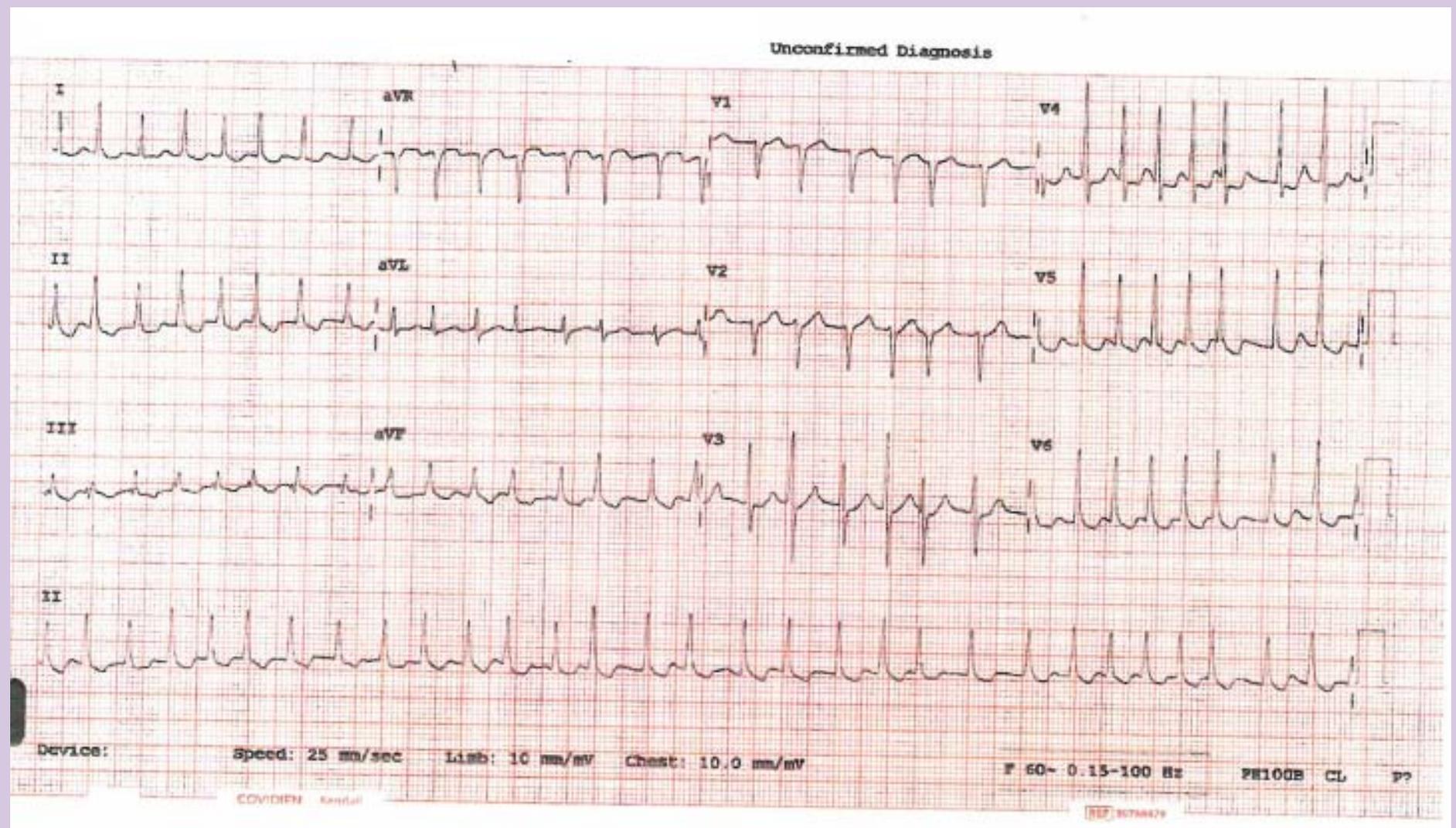
Physical Exam: Cool, pale, diaphoretic skin. She is mildly anxious. Alert and oriented to person, place, time and event.

- Pupils PERL, Trachea midline, No JVD,
- Respiratory: clear, all fields; normal chest wall motion, no use of accessory muscles
- Abdomen: soft, non-tender all quadrants
- Extremities: normal sensation, motor function, coordination x 4. No ankle edema. Capillary refill <2 seconds.

ECG: See attached copy.

Abnormal Labs: Hemoglobin: 8.8, Hematocrit: 26.3 RBCs: 3.50 Troponin: 0.42
BUN: 44 Creatinine: 1.5 BUN/Creatinine Ratio: 29.3

HR by ECG: 188



REVERSIBLE CAUSES CASE STUDY!

PATIENT DISPOSITION: In this case, the patient required 2 Liters of NS; blood pressure increased to 112/71, and her heart rate decreased to the mid 80s. Initially she remained in A-fib, but her heart rate remained below 100. She received two units of whole blood. Her ECG rhythm converted spontaneously to Normal Sinus Rhythm. She was taken to Surgery where a perforated ulcer (gastric erosion) was repaired. Regarding her mild renal failure, the Hospitalist decided to “observe the trend” of her renal function labs. Within two days, her BUN and Creatinine returned to normal. Prior to discharge, and Cardiac Catheterization was performed. It revealed NO Coronary Artery Disease and NORMAL LV function.

Patient presents with any of the following:

- ACS SYMPTOMS (typical or atypical)
- SHOCK / Shock-like symptoms (skin pale, clammy, diaphoretic) of CARDIAC or unknown etiology
- PALPITATIONS / Irregular Heart Rate
- Appears to be in distress

STAT 12 Lead ECG read by doctor within 10 minutes reveals Atrial Fibrillation or Atrial Flutter is primary ECG abnormality:

**ECG = A-Fib / Flutter with RVR
Patient UNSTABLE with RAPID
clinical deterioration . . .**

**ECG = A-Fib / Flutter with RVR
Patient is STABLE**

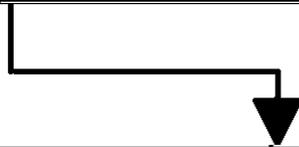
**ECG = A-Fib / Flutter with HR
< 100 Patient is STABLE**

Patient presents with any of the following:

- ACS SYMPTOMS (typical or atypical)
- SHOCK / Shock-like symptoms (skin pale, clammy, diaphoretic) of CARDIAC or unknown etiology
- PALPITATIONS / Irregular Heart Rate
- Appears to be in distress



STAT 12 Lead ECG read by doctor within 10 minutes reveals Atrial Fibrillation or Atrial Flutter is primary ECG abnormality:



ECG = A-Fib / Flutter with HR < 100 Patient is STABLE

Patient is **STABLE**, Ventricular Rate <100:

- Evaluate and manage stroke risk with CHA₂DS₂-VASc Score
- Consider **REVERSIBLE CAUSES**

Patient is STABLE, Ventricular Rate <100:

- **Evaluate stroke risk with CHA₂DS₂-VASc Score**
 - Low Risk (0) may consider no anticoagulation
 - Moderate Risk (1) may consider daily Aspirin
 - High Risk (2 and above): [oral anticoagulation recommended as per 2014 AHA/ACC/HRS Guideline for Management of Atrial Fibrillation.](#)
[Click here to return to this section](#)

Non-Emergency Cardioversion:

CLASS I Recommendation:

For patients with AF or atrial flutter of 48 hours' duration or longer, or when the duration of AF is unknown, anticoagulation with warfarin (INR 2.0 to 3.0) is recommended for at least 3 weeks before and 4 weeks after cardioversion, regardless of the CHA₂DS₂-VASc score and the method (electrical or pharmacological) used to restore sinus rhythm.

(Level of Evidence: B)

Non-Emergency Cardioversion:

CLASS II a Recommendation:

For patients with AF or atrial flutter of 48 hours' duration or longer or of unknown duration who have not been anticoagulated for the preceding 3 weeks, it is reasonable to perform transesophageal echocardiography before cardioversion and proceed with cardioversion if no left atrial thrombus is identified, including in the left atrial appendage, provided that anticoagulation is achieved before transesophageal echocardiography and maintained after cardioversion for at least 4 weeks.

(Level of Evidence: B)

Non-Emergency Cardioversion:

CLASS II a Recommendation:

For patients with AF or atrial flutter of 48 hours' duration or longer or when duration of AF is unknown, anticoagulation with dabigatran, rivaroxaban, or apixaban is reasonable for at least 3 weeks before and 4 weeks after cardioversion.

(Level of Evidence: C)

Non-Emergency Cardioversion:

CLASS II b Recommendation:

For patients with AF or atrial flutter of less than 48 hours' duration who are at low thromboembolic risk, anticoagulation (intravenous heparin, LMWH, or a new oral anticoagulant) or no antithrombotic therapy may be considered for cardioversion, without the need for postcardioversion oral anticoagulation.

(Level of Evidence: C)

Pharmacological Cardioversion:

CLASS I Recommendation:

Flecainide, dofetilide, propafenone, and intravenous ibutilide are useful for pharmacological cardioversion of AF or atrial flutter, provided contraindications to the selected drug are absent.

(Level of Evidence: A)

Pharmacological Cardioversion:

CLASS II a Recommendation:

Administration of oral amiodarone is a reasonable option for pharmacological cardioversion of AF.

(Level of Evidence: A)

Pharmacological Cardioversion:

CLASS II a Recommendation:

Propafenone or flecainide (“pill-in-the-pocket”) in addition to a beta blocker or nondihydropyridine calcium channel antagonist is reasonable to terminate AF outside the hospital once this treatment has been observed to be safe in a monitored setting for selected patients.

(Level of Evidence: B)

Pharmacological Cardioversion:

CLASS III Recommendation: Harm

Dofetilide therapy should not be initiated out of hospital because of the risk of excessive QT prolongation that can cause torsades de pointes.

(Level of Evidence: B)

**Thank you for
your time and
attention !!**

QUESTIONS ? ? ?

BONUS MATERIAL

- SPECIAL CONSIDERATIONS from the 2014 AHA/ACC/HRS Guideline for the Management of patients in Atrial Fibrillation
- AF / AFL Emerg Dept Physician's Order Set
- Flowchart: Emergency Mgmt of AF / AFL
- Cryotherapy in Pulmonary Vein Isolation (PVI): the St. Joseph's Hospital experience in the "Arctic Front" PVI Clinical Trials.
- Animation of "The Formation of Delta Waves" in Wolff-Parkinson-White

SPECIAL CONSIDERATIONS:

The special considerations in this section have not been presented previously in this program. These considerations are excerpts from the 2014 AHA/ACC/HRS Guideline for the Management of Patients with Atrial Fibrillation and include: **Heart Failure, Hypertrophic Cardiomyopathy, Hyperthyroidism, Acute Coronary Syndrome, Pulmonary Disease, Wolff-Parkinson-White, and the Peri-Operative Management of AF in the Cardiac Surgery Setting.**

SPECIAL CONSIDERATIONS:

HEART FAILURE:

CLASS III (Harm)

Nondihydropyridine calcium channel antagonists should not be used in patients with decompensated HF as these may lead to further hemodynamic compromise.

(Level of Evidence: C)

From: 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation:

SPECIAL CONSIDERATIONS:

Hypertrophic Cardiomyopathy

CLASS I Recommendation:

Anticoagulation is indicated in patients with hypertrophic cardiomyopathy (HCM) with AF independent of the CHA₂DS₂-VASc score.

(Level of Evidence: B)

From: 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation:

SPECIAL CONSIDERATIONS:

Hypertrophic Cardiomyopathy

CLASS II a Recommendation:

Antiarrhythmic medications can be useful to prevent recurrent AF in patients with HCM.

Amiodarone or disopyramide combined with a beta blocker or nondihydropyridine calcium channel antagonists are reasonable for therapy.

(Level of Evidence: C)

From: 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation:

SPECIAL CONSIDERATIONS:

Hyperthyroidism

CLASS I Recommendations:

Beta blockers are recommended to control ventricular rate in patients with AF complicating thyrotoxicosis unless contraindicated.

In circumstances in which a beta blocker cannot be used, a nondihydropyridine calcium channel antagonist is recommended to control the ventricular rate.

(Level of Evidence: C)

From: 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation:

SPECIAL CONSIDERATIONS:

AF Complicating Acute Coronary Syndromes

CLASS I Recommendation:

Urgent direct-current cardioversion of new-onset AF in the setting of acute coronary syndromes (ACS) is recommended for patients with hemodynamic compromise, ongoing ischemia, or inadequate rate control.

(Level of Evidence: C)

From: 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation:

SPECIAL CONSIDERATIONS:

AF Complicating Acute Coronary Syndromes

CLASS I Recommendation:

Intravenous beta blockers are recommended to slow a rapid ventricular response to AF in patients with ACS who do not display HF, hemodynamic instability, or bronchospasm.

(Level of Evidence: C)

From: 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation:

SPECIAL CONSIDERATIONS:

AF Complicating Acute Coronary Syndromes

CLASS I Recommendation:

Intravenous beta blockers are recommended to slow a rapid ventricular response to AF in patients with ACS who do not display HF, hemodynamic instability, or bronchospasm.

(Level of Evidence: C)

From: 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation:

SPECIAL CONSIDERATIONS:

AF Complicating Acute Coronary Syndromes

CLASS I Recommendation:

For patients with ACS and AF with a CHA₂DS₂-VASc score of 2 or greater, anticoagulation with warfarin is recommended unless contraindicated.

(Level of Evidence: C)

From: 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation:

SPECIAL CONSIDERATIONS:

AF Complicating Acute Coronary Syndromes

CLASS II b Recommendation:

Administration of amiodarone or digoxin may be considered to slow a rapid ventricular response in patients with ACS and AF associated with severe left ventricular dysfunction and HF or hemodynamic instability.

(Level of Evidence: C)

From: 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation:

SPECIAL CONSIDERATIONS:

AF Complicating Acute Coronary Syndromes

CLASS II b Recommendation:

Administration of nondihydropyridine calcium antagonists might be considered to slow a rapid ventricular response in patients with ACS and AF only in the absence of significant HF or hemodynamic instability.

(Level of Evidence: C)

From: 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation:

SPECIAL CONSIDERATIONS:

Pulmonary Disease

CLASS I Recommendation:

A nondihydropyridine calcium channel antagonist is recommended to control the ventricular rate in patients with AF and chronic obstructive pulmonary disease.

(Level of Evidence: C)

From: 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation:

SPECIAL CONSIDERATIONS:

Pulmonary Disease

CLASS I Recommendation:

Direct-current cardioversion should be attempted in patients with pulmonary disease who become hemodynamically unstable as a consequence of new-onset AF.

(Level of Evidence: C)

From: 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation:

SPECIAL CONSIDERATIONS:

Wolff-Parkinson-White

Catheter ablation of the accessory pathway is recommended in symptomatic patients with pre-excited AF, especially if the accessory pathway has a short refractory period that allows rapid antegrade conduction.

(Level of Evidence: C)

From: 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation:

SPECIAL CONSIDERATIONS:

Perioperative Management of AF in Cardiac Surgery

CLASS I Recommendations:

Treating patients who develop AF after cardiac surgery with a beta blocker is recommended unless contraindicated.

(Level of Evidence: A)

A nondihydropyridine calcium channel blocker is recommended when a beta blocker is inadequate to achieve rate control in patients with postoperative AF.

(Level of Evidence: B)

From: 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation:

SPECIAL CONSIDERATIONS:

Perioperative Management of AF in Cardiac Surgery

CLASS II a Recommendations:

Preoperative administration of amiodarone reduces the incidence of AF in patients undergoing cardiac surgery and is reasonable as prophylactic therapy for patients at high risk for postoperative AF. *(Level of Evidence: A)*

It is reasonable to restore sinus rhythm pharmacologically with ibutilide or direct-current cardioversion in patients who develop postoperative AF, as advised for nonsurgical patients. *(Level of Evidence: B)*

From: 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation:

SPECIAL CONSIDERATIONS:

Perioperative Management of AF in Cardiac Surgery

CLASS II a Recommendations, continued:

It is reasonable to administer antiarrhythmic medications in an attempt to maintain sinus rhythm in patients with recurrent or refractory postoperative AF, as advised for other patients who develop AF. *(Level of Evidence: B)*

It is reasonable to administer antithrombotic medication in patients who develop postoperative AF, as advised for nonsurgical patients. *(Level of Evidence: B)*

From: 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation:

SPECIAL CONSIDERATIONS:

Perioperative Management of AF in Cardiac Surgery

CLASS II a Recommendations, continued:

It is reasonable to manage well-tolerated, new-onset postoperative AF with rate control and anticoagulation with cardioversion if AF does not revert spontaneously to sinus rhythm during follow-up.

(Level of Evidence: C)

From: 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation:

SPECIAL CONSIDERATIONS:

Perioperative Management of AF in Cardiac Surgery

CLASS II b Recommendations:

Prophylactic administration of sotalol may be considered for patients at risk of developing AF after cardiac surgery.

(Level of Evidence: B)

Administration of colchicine may be considered for patients postoperatively to reduce AF after cardiac surgery.

(Level of Evidence: B)

From: 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation:

Emergency Department Atrial Fibrillation / Flutter Physician Orders

Page 1 of 3



Date/Time: ____/____/____ at: _____ hours

Pre-checked orders have been selected based on current evidence-based medicine, and are consistent with 2014 AHA/ACC/HRS guidelines for Atrial Fibrillation. Bulleted (●) orders indicate standard hospital procedures. To DESELECT any of these orders, draw a line through the entire order and initial it.

ALLERGIES: _____

WEIGHT: _____ lbs / kg (circle one) HEIGHT: _____ (ft/in)

Electrophysiology / Cardiology Consult: _____

ADMITTING PHYSICIAN: _____

DIAGNOSIS: Atrial Fibrillation Atrial Flutter Acute Onset Chronic

NURSING ORDERS:

- OBTAIN STAT 12 Lead ECG in not done in Triage. If Inferior wall MI is noted, obtain tracing of Lead V4R.
- If STEMI is present, implement STEMI ORDERS
- Implement Emergency Department Cardiac Monitoring Protocol.
- Establish IV access:
 - 0.9% sodium chloride
 - Fluid challenge: _____ml bolus over _____ minutes
 - _____ml/hr continuous rate
 - hepbloc / reseal: flush with 3ml NS every 8 hours
- Keep patient NPO except medications
- Oxygen: Room air only for patients with SAO₂ levels greater than 94%. Administer 2 - 4 liters per minute via nasal canula to maintain SAO₂ between 90 - 94%

CONDITION:

- Stable
- Unstable: Prepare for Immediate Synchronized Cardioversion:
 - Page Respiratory Therapy STAT
 - Have the following equipment immediately at patient's bedside:
 - Monitor /Defibrillator / External Pacemaker
 - Crash Cart
 - O₂, Suction,
 - IV Sedative(s): _____
- Synchronized Cardioversion energy settings per AHA ACLS Guidelines: 120 - 200 joules

NOTE: For patients who may have been in A-Fib or A-Flutter for more than 48 hours who require STAT DC Cardioversion, anticoagulation therapy should be started as soon as possible and continued for 4 weeks. (Class I, LOE: B) *

Imaging Studies:

- STAT Chest X-ray
- Echocardiogram to evaluate LA size, EF, and valvular heart disease (if not completed in ED)
- Transesophageal Echocardiogram (TEE) rule out LA thrombus
- Other: _____

* Reference source for all recommendations from "2014 AHA/ACC/HRS Guidelines for Management of Atrial Fibrillation" unless otherwise noted.

PATIENT LABEL: _____

Physician Signature / date / time

ER Physician's Order set for Atrial Fibrillation / Atrial Flutter developed by Bayfront Health Dade City

[Download this model "A-Fib / Flutter ER Physician's Order Set"](#)

Management of Atrial Fibrillation & Atrial Flutter in the Emergency Setting

by: Wayne Ruppert
Cardiovascular
Coordinator



Patient presents to ER with any of the following:
- CARDIAC symptoms: typical / atypical ACS
- Palpitations, fast heart rate
- SHOCK-like appearance (skin pale, clammy, diaphoretic)
- Appears to be in distress

STAT 12 Lead ECG obtained and read by physician within 10 minutes reveals Atrial Fibrillation or Atrial Flutter is the patient's primary abnormality:

ECG = A-Fib / Flutter with RVR
Patient UNSTABLE with rapid clinical deterioration ...

ECG = A-Fib with RVR - Patient STABLE

ECG = A-fib / Flutter with HR < 100 Patient STABLE

IMMEDIATE Synchronized Cardioversion at 120 - 200 joules biphasic

Consider Reversible Causes & treat as indicated:
If A-FIB is NOT resolved, continue ...

- Hypertension / Hyperthyroidism
- Hypotension / Hypovolemia
- AMI / CAD / Pericarditis
- Electrolytes /
- Hypothermia
- Alcohol / Meds / Drugs
- Electrocutation
- Pulmonary Embolus
- Recent Chest Surgery

Are any of these present: ?
- Delta waves / wide QRS tach
- History of Wolff-Parkinson-White

YES

Consider Rate Control with PROCAINAMIDE or ILBUTIDE as needed, to keep HR < 100

NO

Consider Rate Control with Calcium Anatonist or Beta Blocker, as needed, to keep HR < 100

Obtain STAT INR. Is INR in therapeutic range?

YES

NO

Initiate Anticoagulation Therapy to achieve INR of 2.0 - 3.0

Order TEE

Continue with ED work-up, evaluate patient's CHA2DS2-VASc and HAS-BLED Risk Stratification and SAF Scores, consider consultation with Hospitalist and Electrophysiologist, consider appropriate disposition: Admission to ICU / CPCU / Telemetry / Observation / Discharge

Atrial Fibrillation / Atrial Flutter emergency care flowchart developed by Bayfront Health Dade City

[Download this A-Fib / Flutter Emergency Care Flowchart - BHDC](#)

Cryotherapy for Pulmonary Vein Isolation.

In this catheter-based procedure, the left atrium is accessed via the venous system and atrial trans-septal puncture. A balloon catheter is advanced to the ostium of each pulmonary vein and is inflated with liquid nitrogen.

The nitrogen is cooled to -70 degrees Fahrenheit, effectively creating a “ring of necrosis” which isolates the pulmonary veins from the left atrium.

The aberrant electrical signals originating in the pulmonary veins are unable to cross the necrotic tissue.

Dr. Irwin’s success rate for keeping patients free of atrial fibrillation after this procedure exceeds 95 percent.

MAR-1995

46 yr
Male Caucasian
Room:OP
Loc:8 Option:25

Vent. rate 100 BPM
PR interval 158 ms
QRS duration 88 ms
QT/QTc 312/402 ms
P-R-T axes 52 -12 38

Normal sinus rhythm with occasional Premature supraventricular complexes
Left atrial enlargement
Borderline ECG

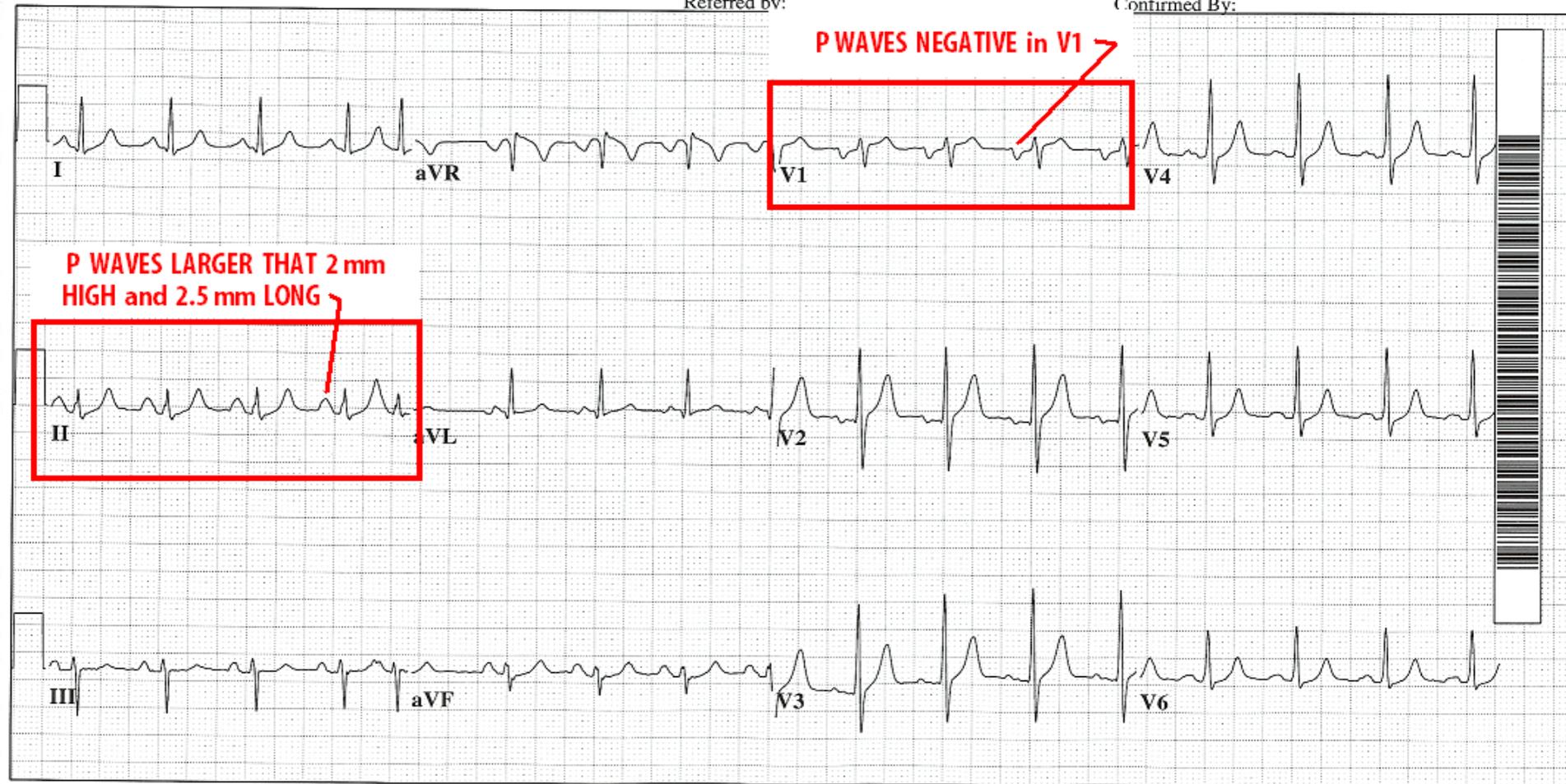
CASE STUDY: 46 y/o MALE HAS LEFT ATRIAL HYPERTROPHY in 1995

Referred by:

Confirmed By:

P WAVES NEGATIVE in V1

**P WAVES LARGER THAT 2 mm
HIGH and 2.5 mm LONG**



APR-2004

ST. JOSEPH'S HOSPITAL

55 yr
Male Caucasian

Vent. rate	178	BPM
PR interval	*	ms
QRS duration	90	ms
QT/QTc	264/454	ms
P-R-T axes	* -19	46

**UNEDITED COPY - REPORT IS COMPUTER GENERATED
PHYSICIAN INTERPRETATION

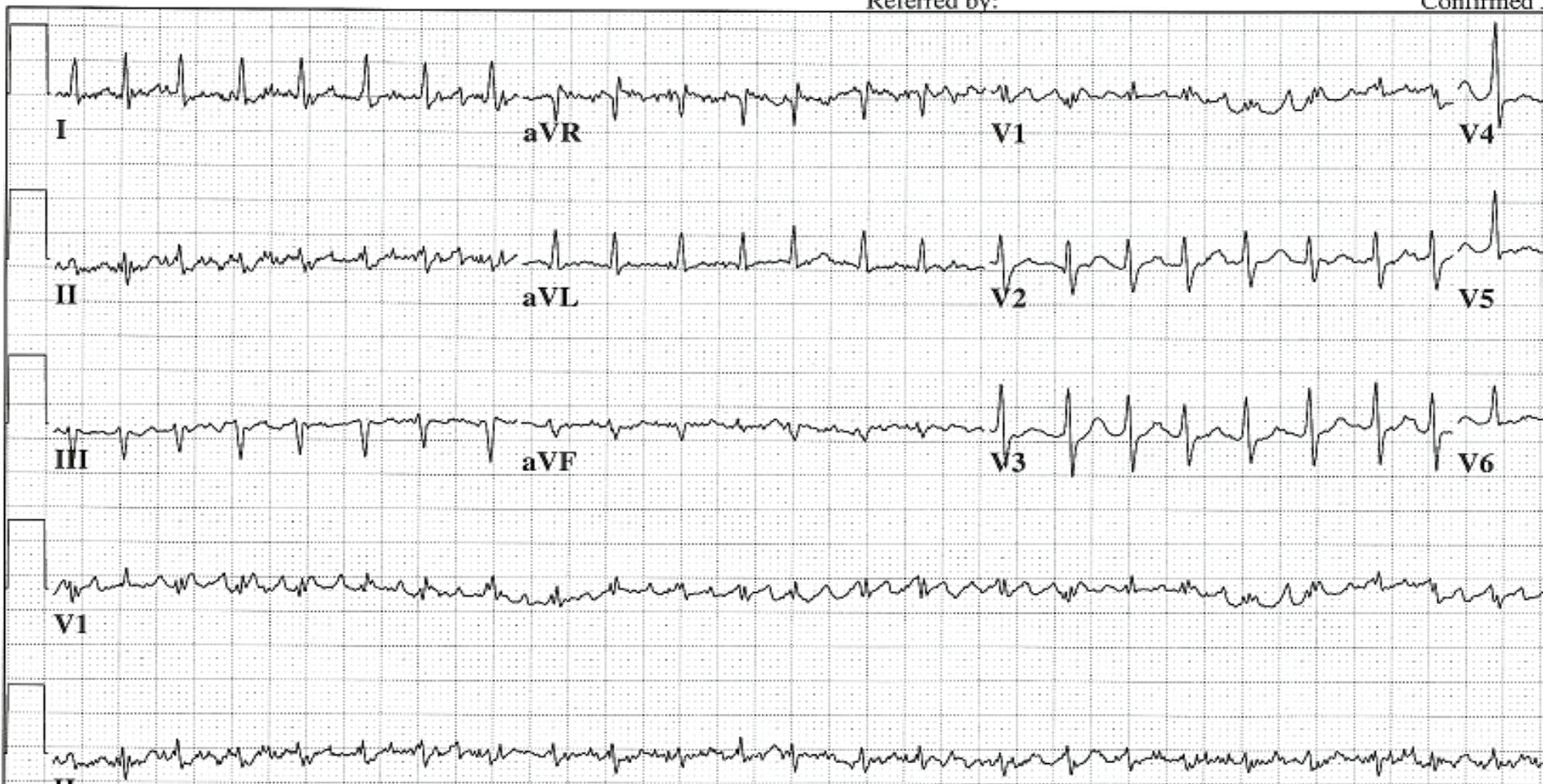
Atrial fibrillation with rapid ventricular response
with premature ventricular or aberrantly conducted complexes
Nonspecific ST abnormality, probably digitalis effect
Abnormal ECG

Loc:3 Option:23

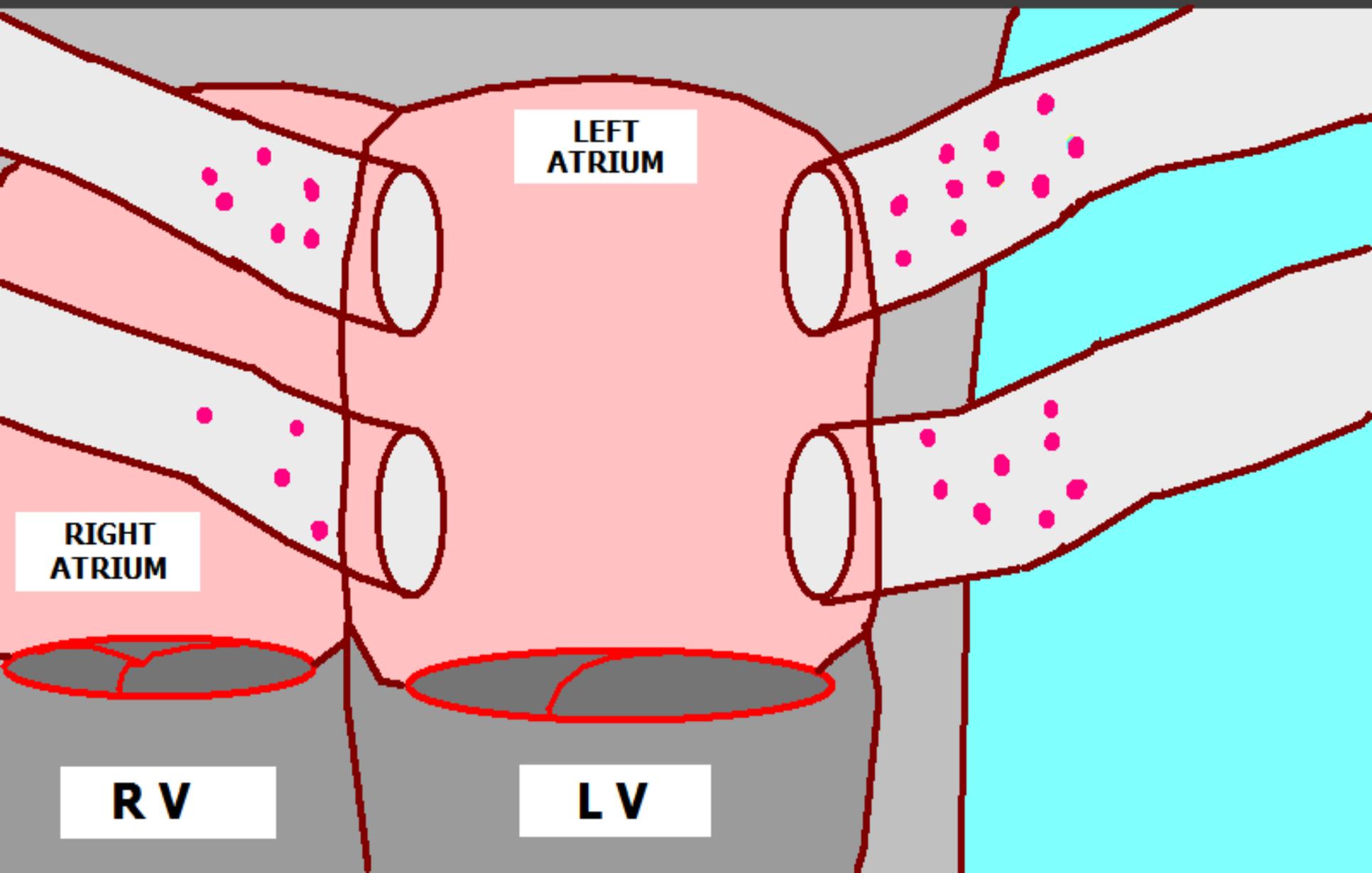
**CASE STUDY: PATIENT IS NOW 55 YEARS OLD (9 YEARS SINCE LAST EKG SHOWING LEFT ATRIAL ENLARGEMENT)
PATIENT NOW HAS DEVELOPED ATRIAL FIBRILLATION (W/ RAPID VENTRICULAR RESPONSE)**

Referred by:

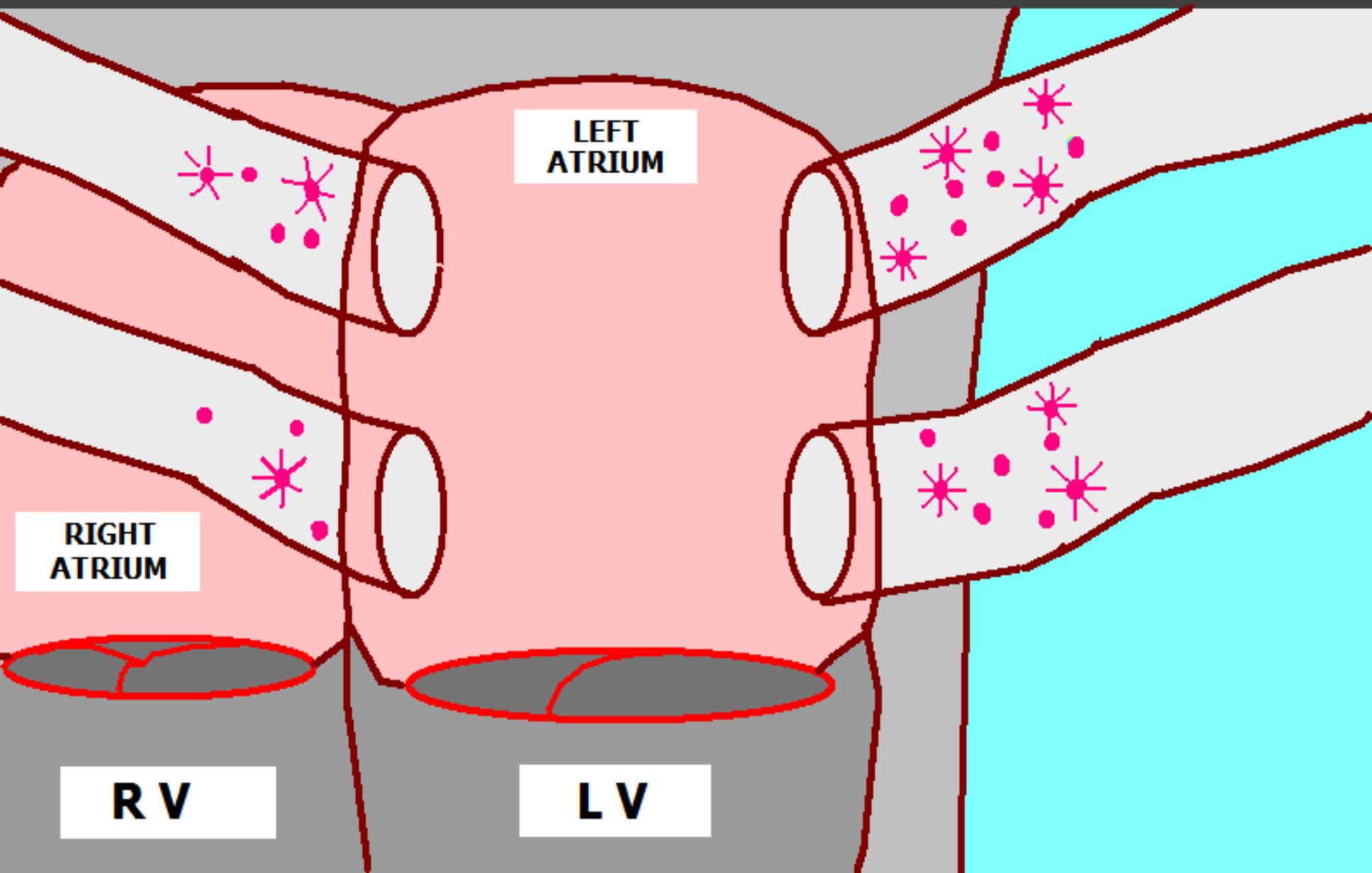
Confirmed:



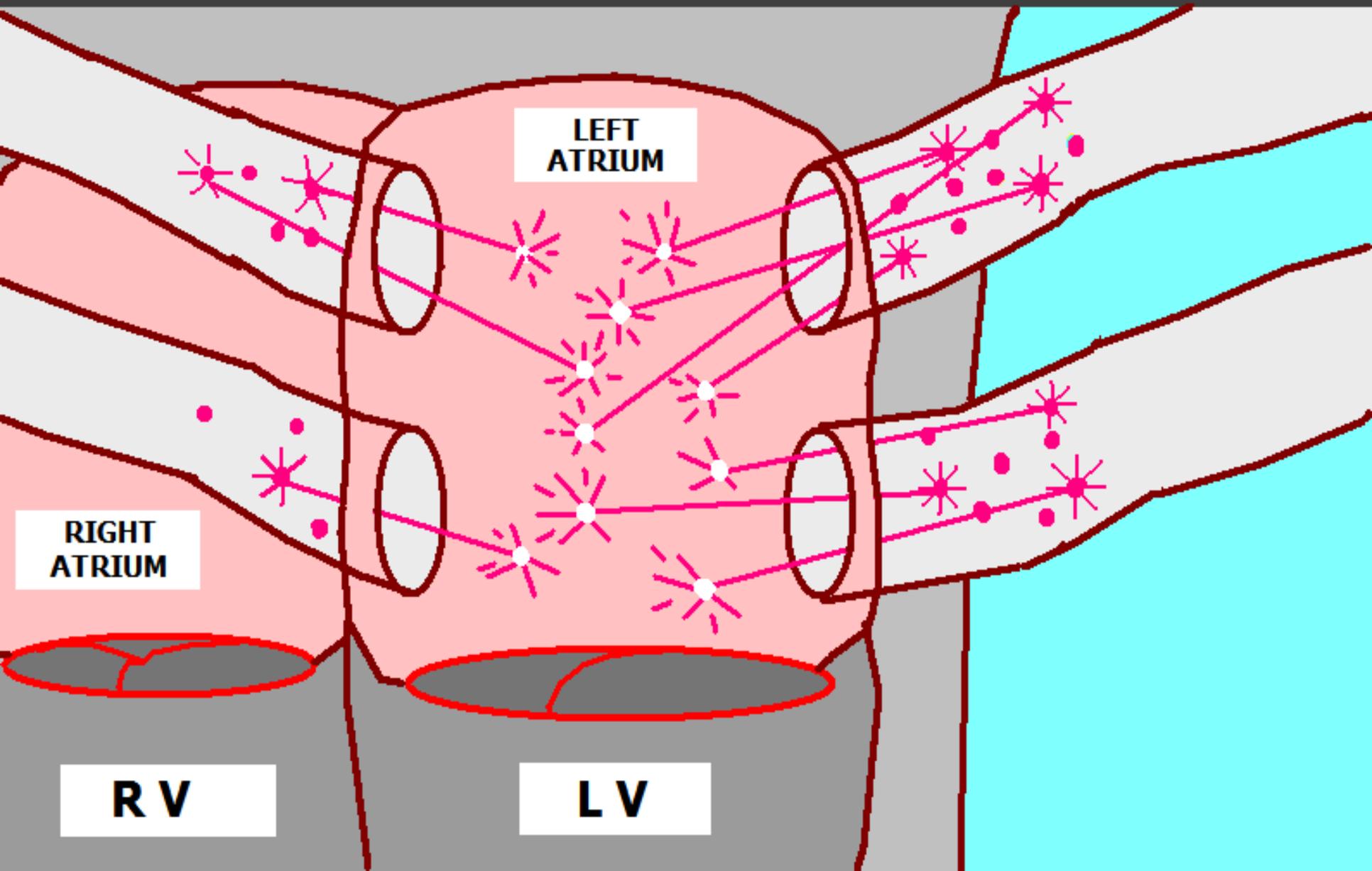
CAUSES OF ATRIAL FIBRILLATION: - PULMONARY VEIN AUTOMATICITY



CAUSES OF ATRIAL FIBRILLATION: - PULMONARY VEIN AUTOMATICITY

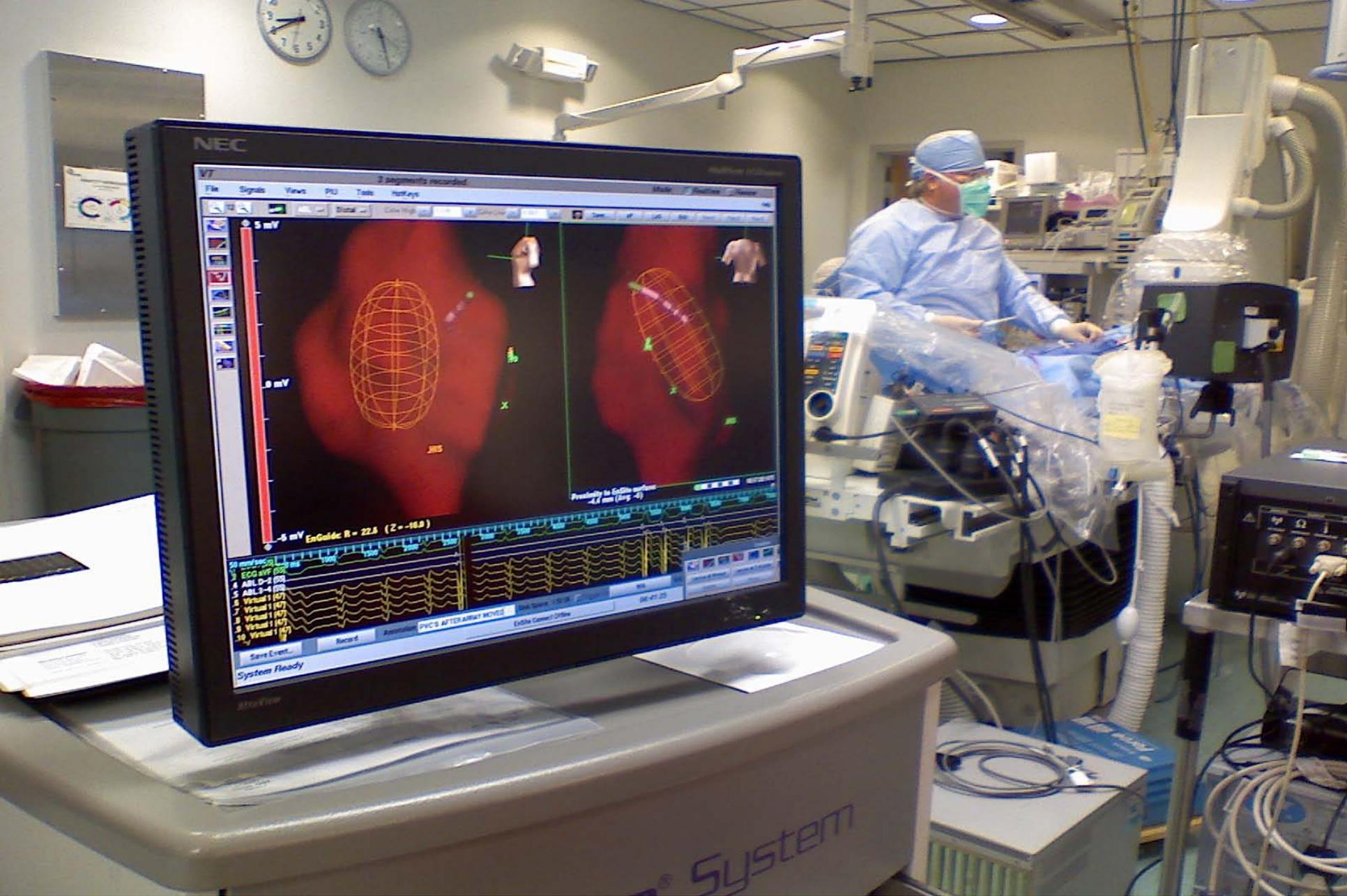


CAUSES OF ATRIAL FIBRILLATION: - PULMONARY VEIN AUTOMATICITY

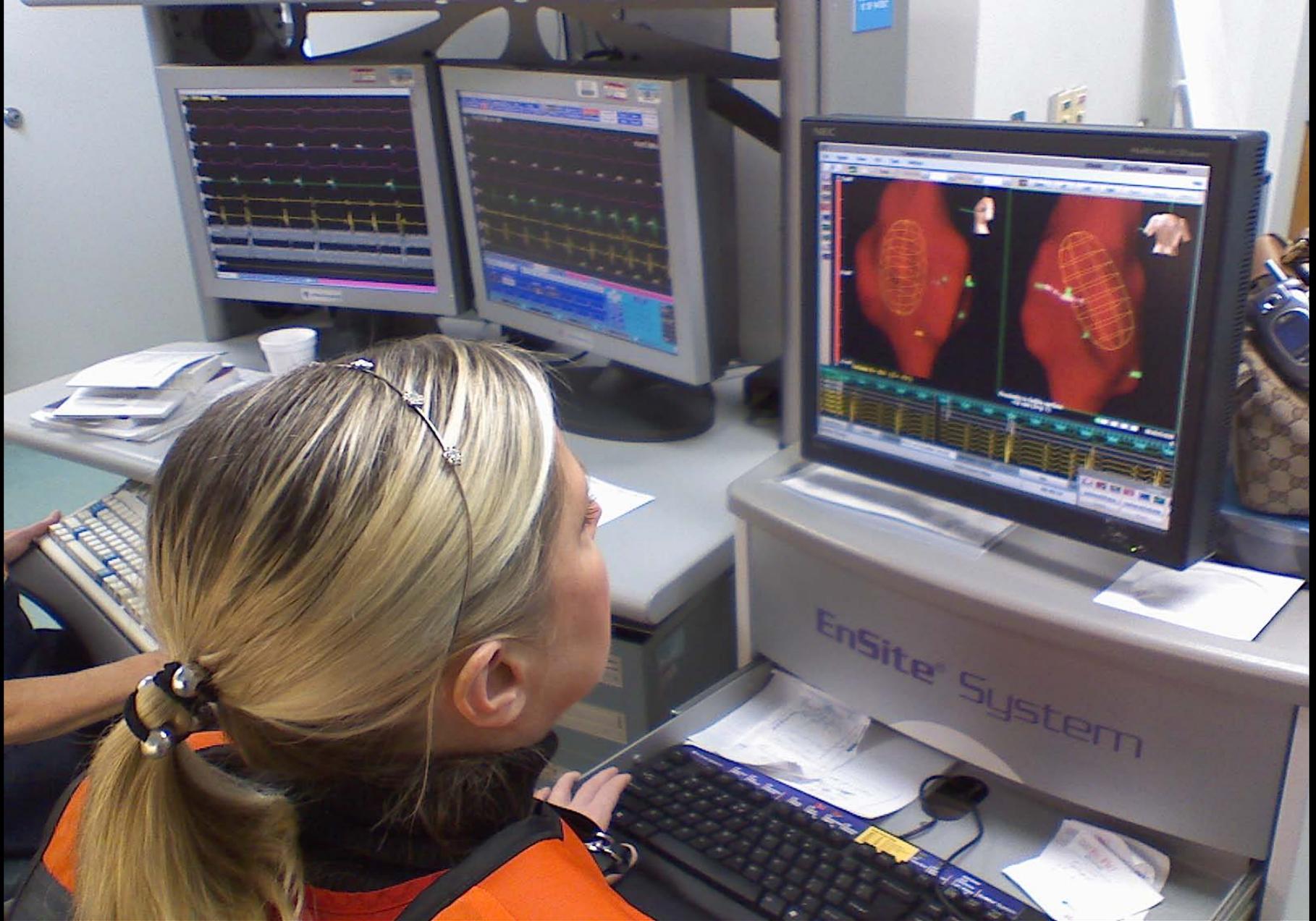




Wayne Ruppert (L) assisting Dr. James Irwin (R) with Pulmonary Vein Isolation during the Arctic Front clinical trials for Atrial Fibrillation Ablation at St. Joseph's Hospital, Tampa, FL in 2007



“The Master at work” -- Dr. James Irwin performing a Pulmonary Vein Isolation procedure during the “Arctic Front” clinical trials at St Joseph’s Hospital, Tampa, FL in 2008



Mapping of Pulmonary Vein (electrical) potentials (two screens to left) and use of 3D imaging to correlate electrical signals with left atrial and pulmonary vein anatomy

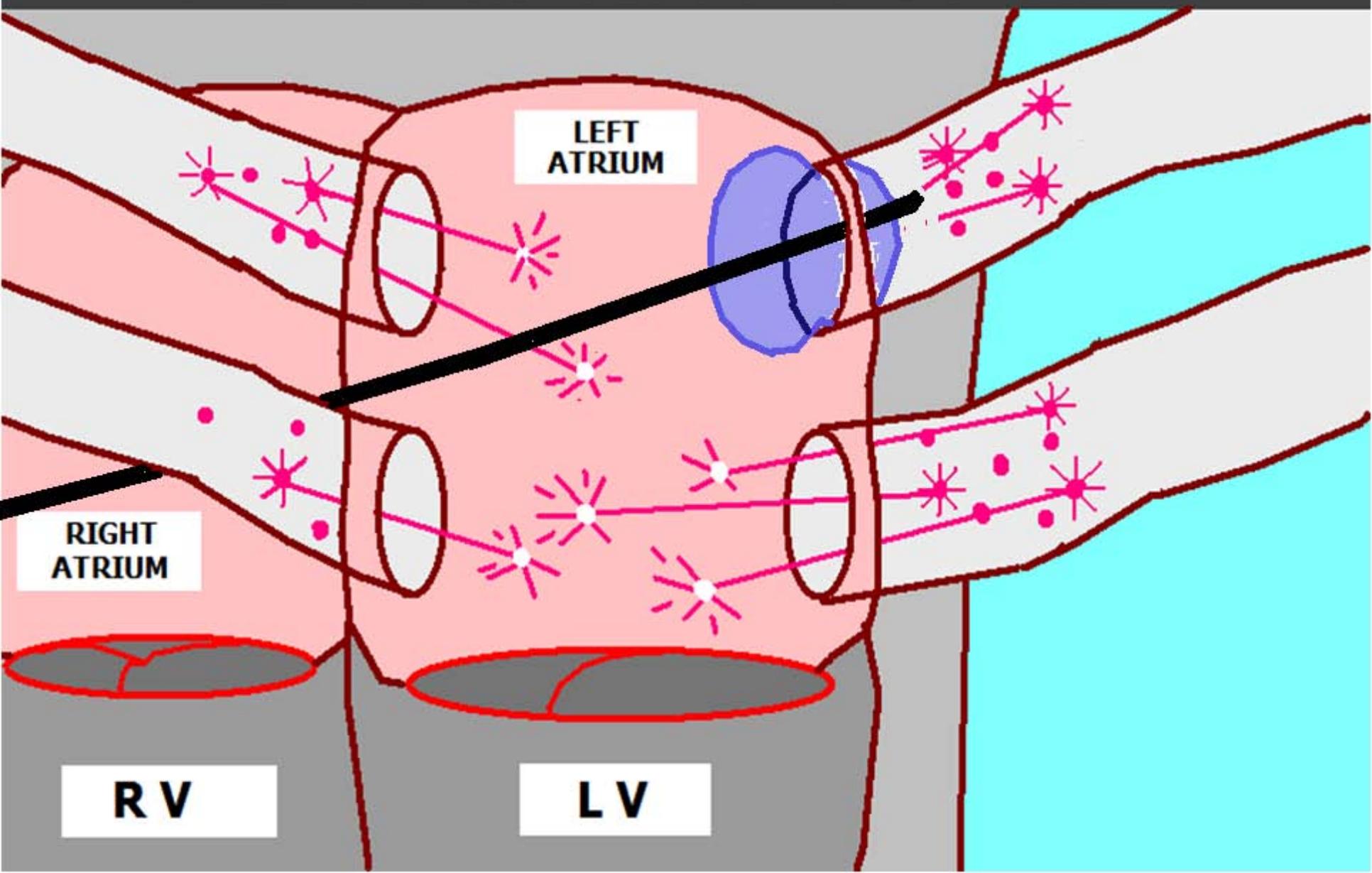
Wayne Ruppert operating the Medtronic “Arctic Front” Cryoablation control device during the “Cryoballoon Ablation of Pulmonary Veins for Paroxysmal Atrial Fibrillation Clinical Trial” at St Joseph’s Hospital Heart Institute in 2008.

The device pictured cools liquid nitrogen in a balloon placed into the patient’s pulmonary veins to -70 degrees Fahrenheit.

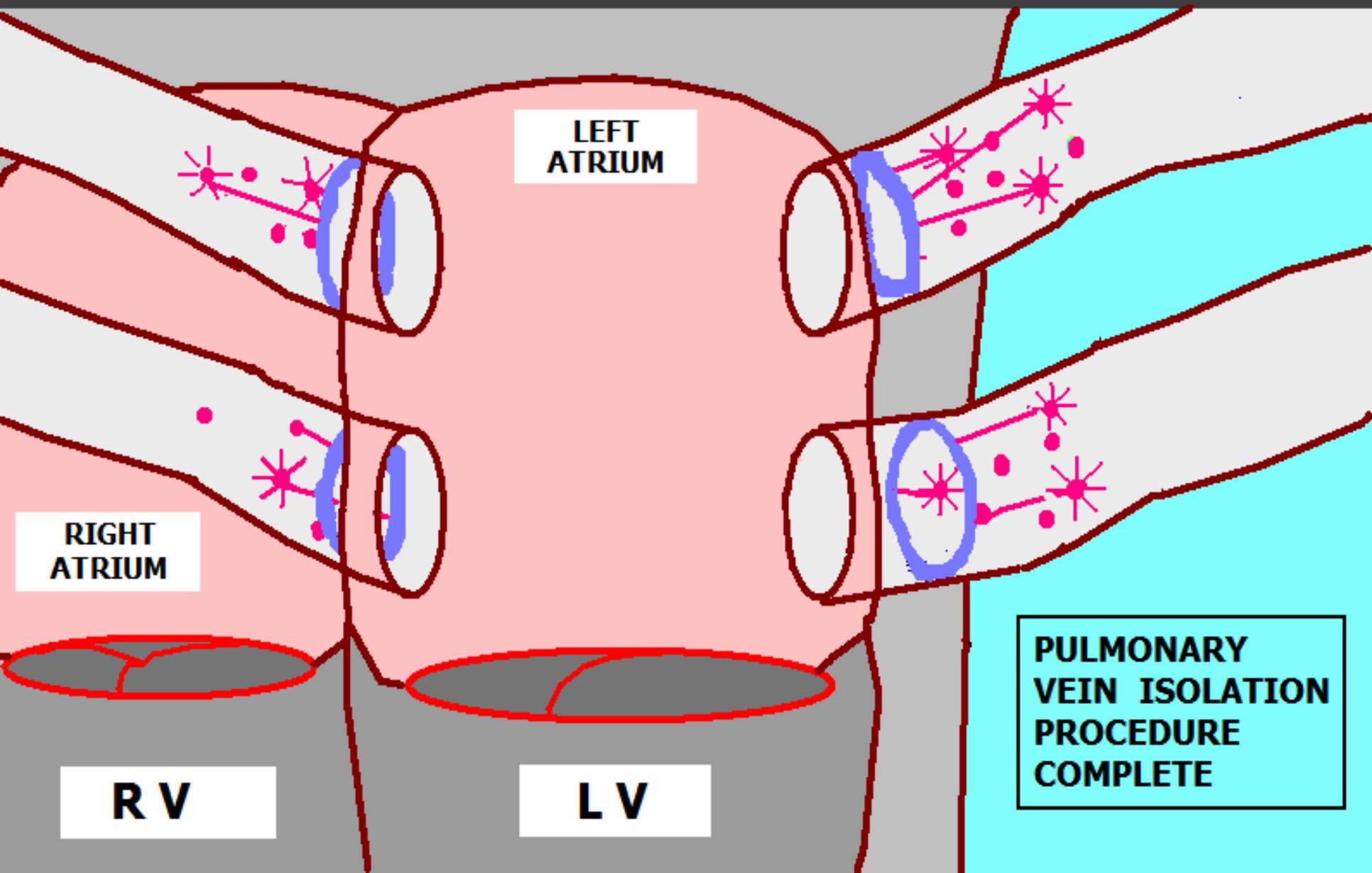
After this procedure, over 95% of Dr. Irwin’s patients remained free of Atrial Fibrillation.



CAUSES OF ATRIAL FIBRILLATION: - PULMONARY VEIN AUTOMATICITY



CAUSES OF ATRIAL FIBRILLATION: - PULMONARY VEIN AUTOMATICITY



Animated slide sequence:

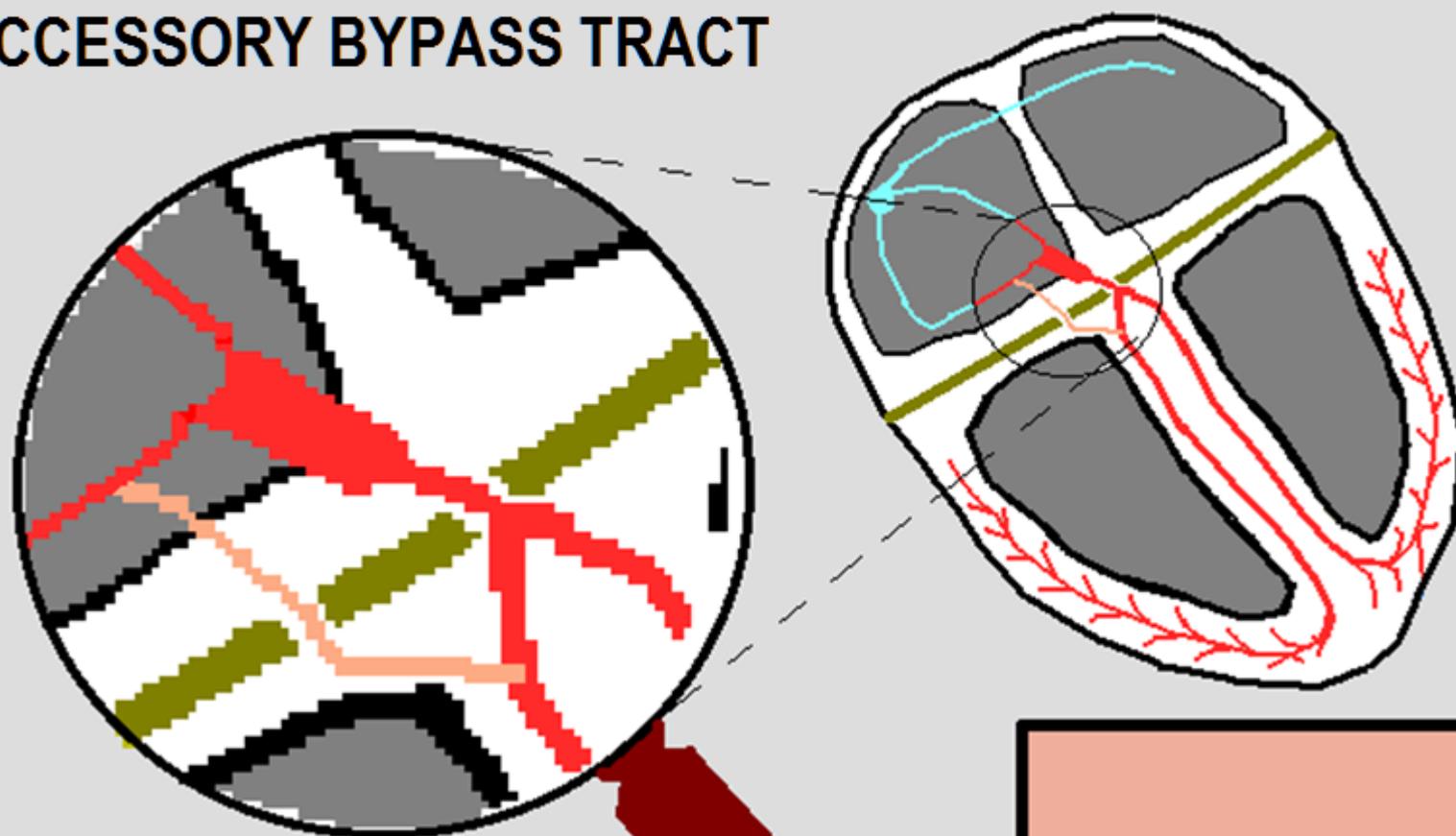
“Formation of a Delta Wave in
Wolff-Parkinson-White Syndrome”

By: Wayne Ruppert
Cardiovascular Coordinator
Bayfront Health Dade City

INSTRUCTIONS: Advance rapidly through the next 9 slides. Note the “wave of depolarization” (in blue) with respect to conduction in the AV node and the “bypass tract” (just to the left of the AV node)! 😊

THE CARDIAC ELECTRICAL SYSTEM

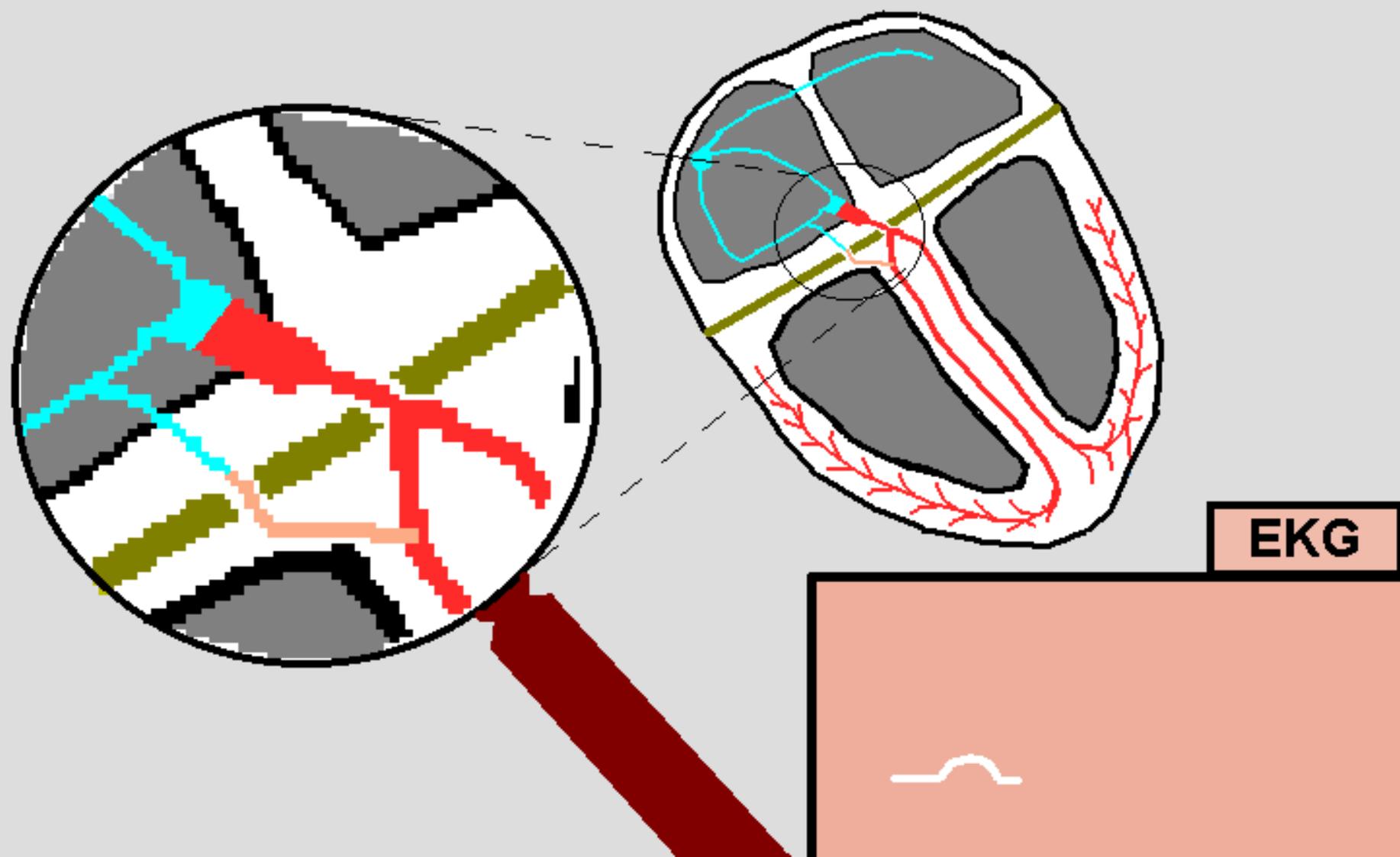
ACCESSORY BYPASS TRACT



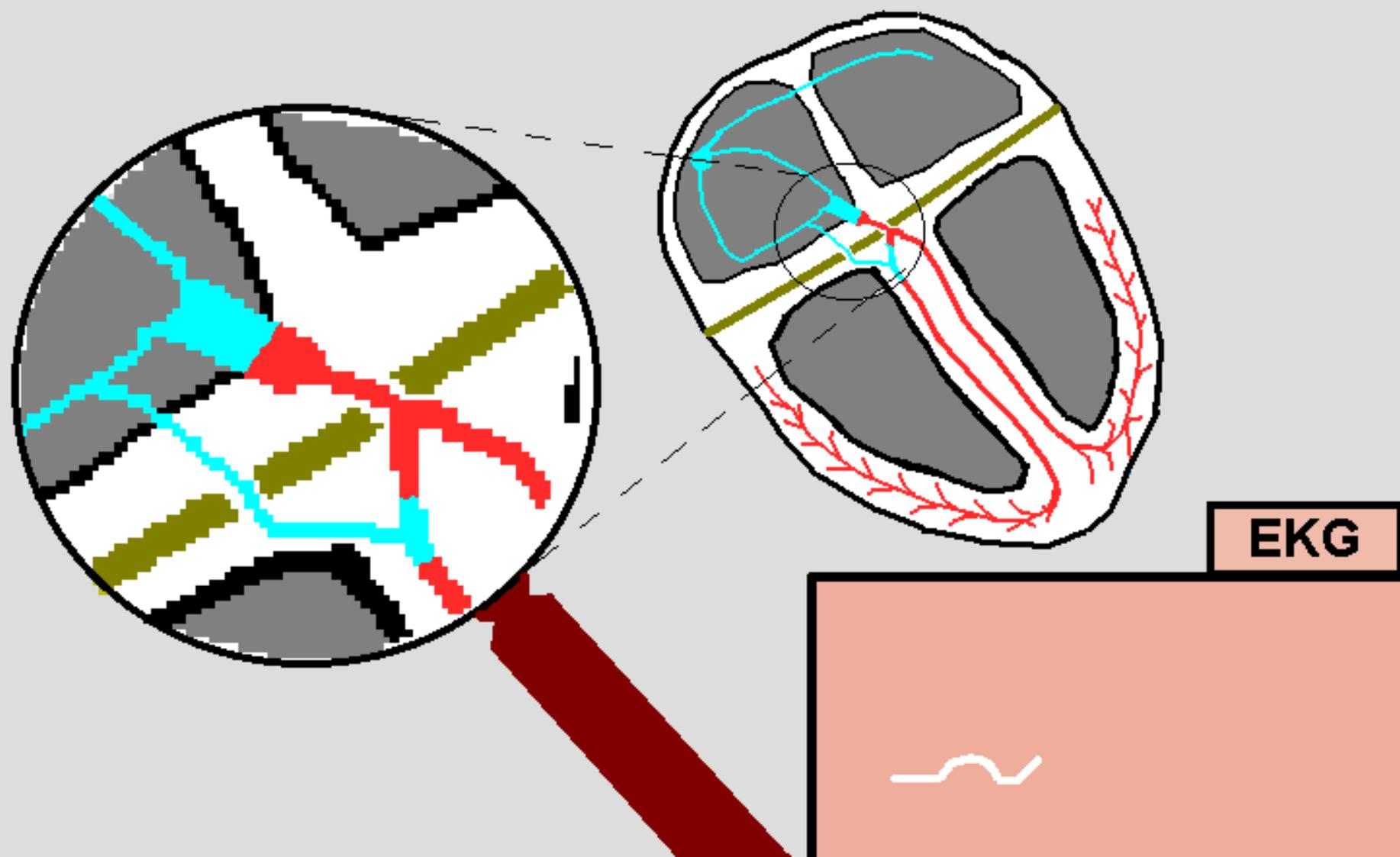
EKG



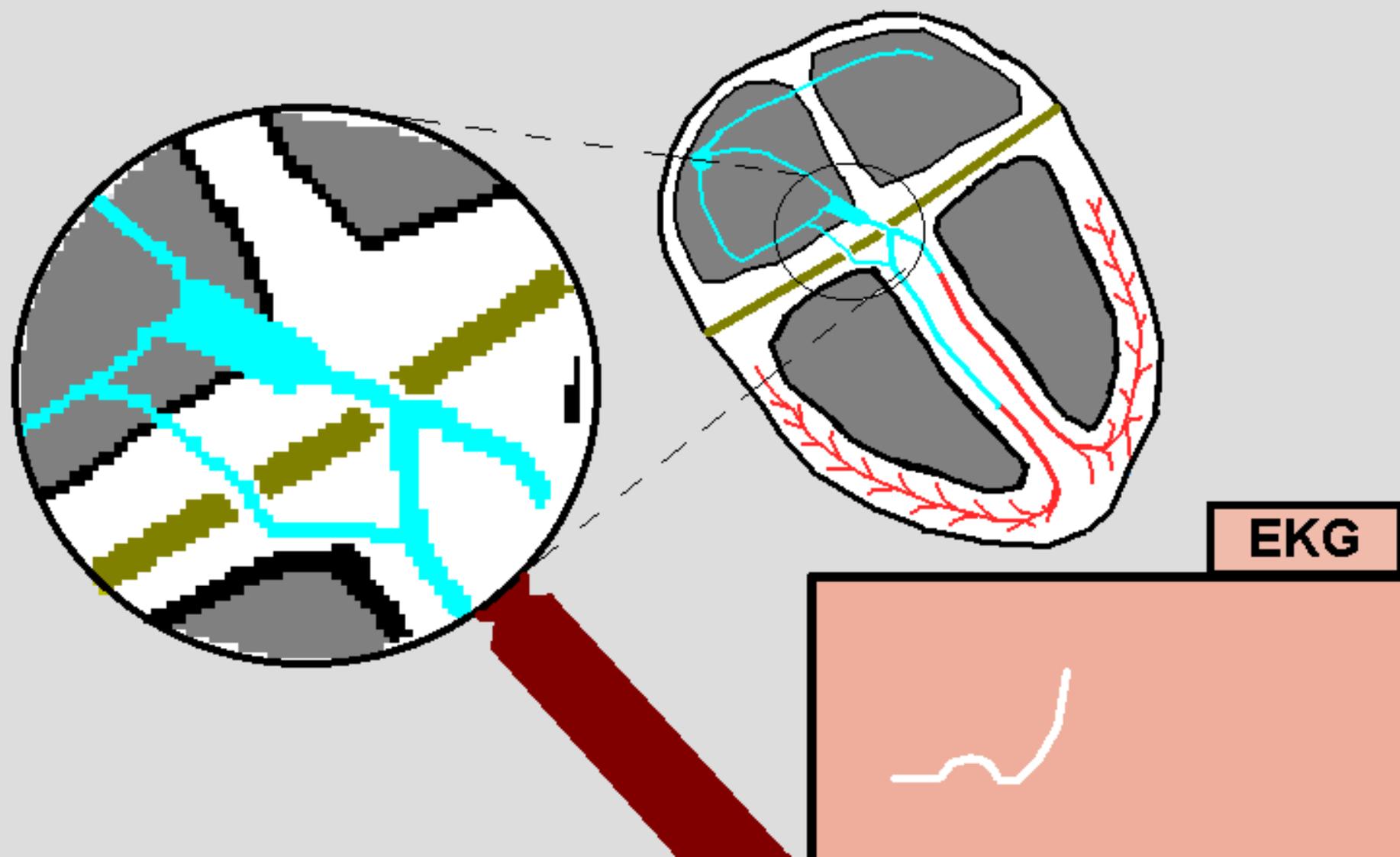
THE CARDIAC ELECTRICAL SYSTEM



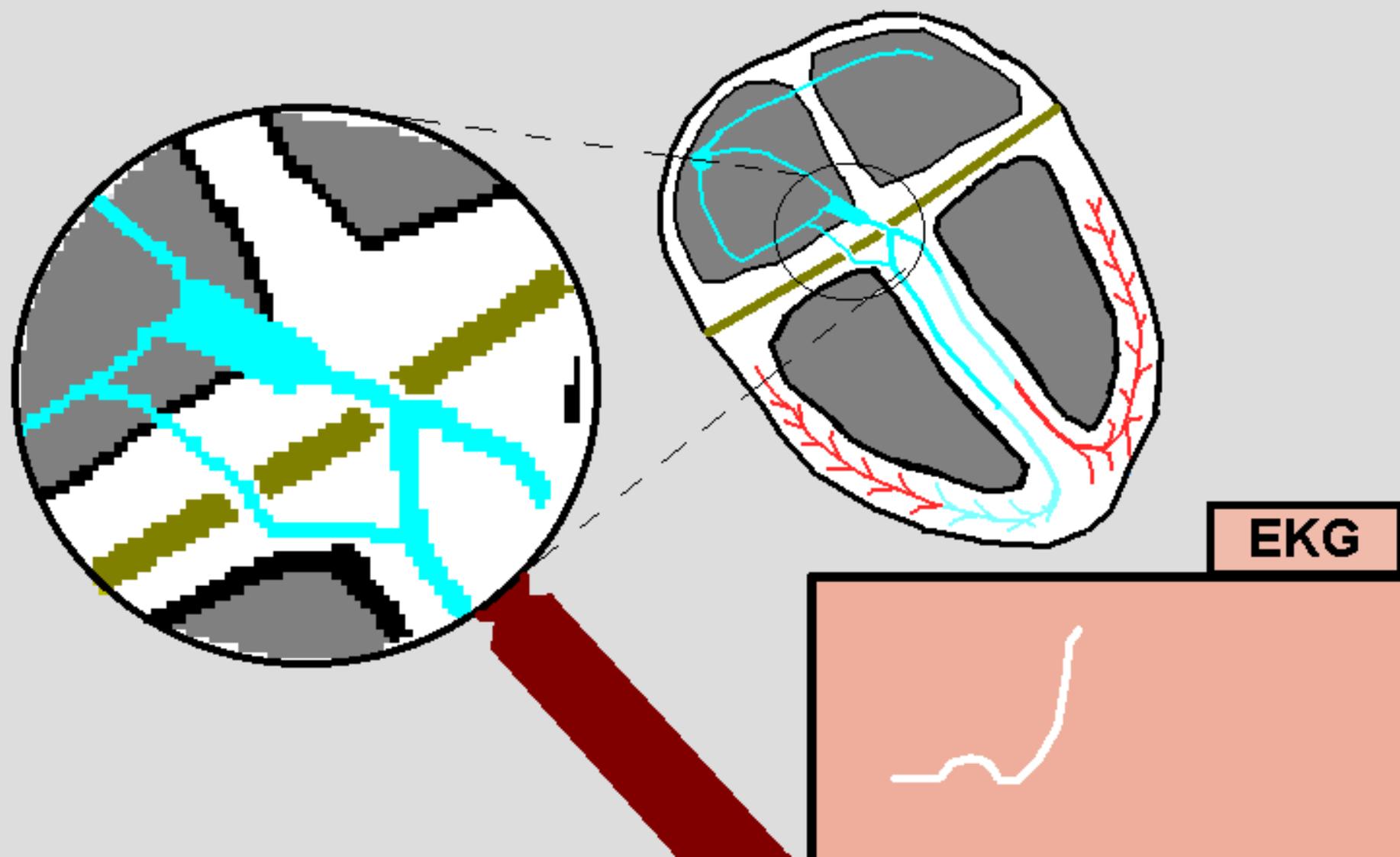
THE CARDIAC ELECTRICAL SYSTEM



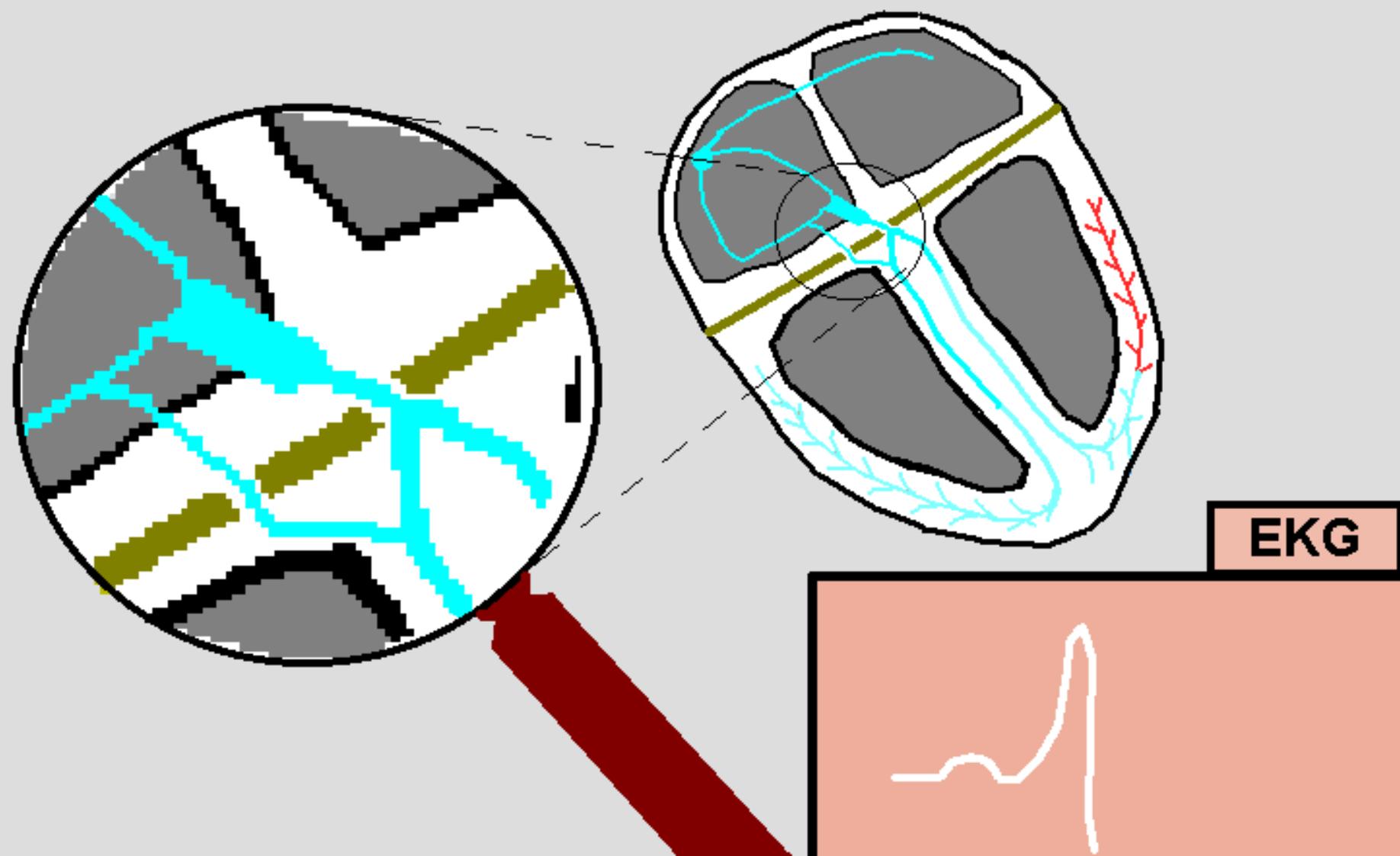
THE CARDIAC ELECTRICAL SYSTEM



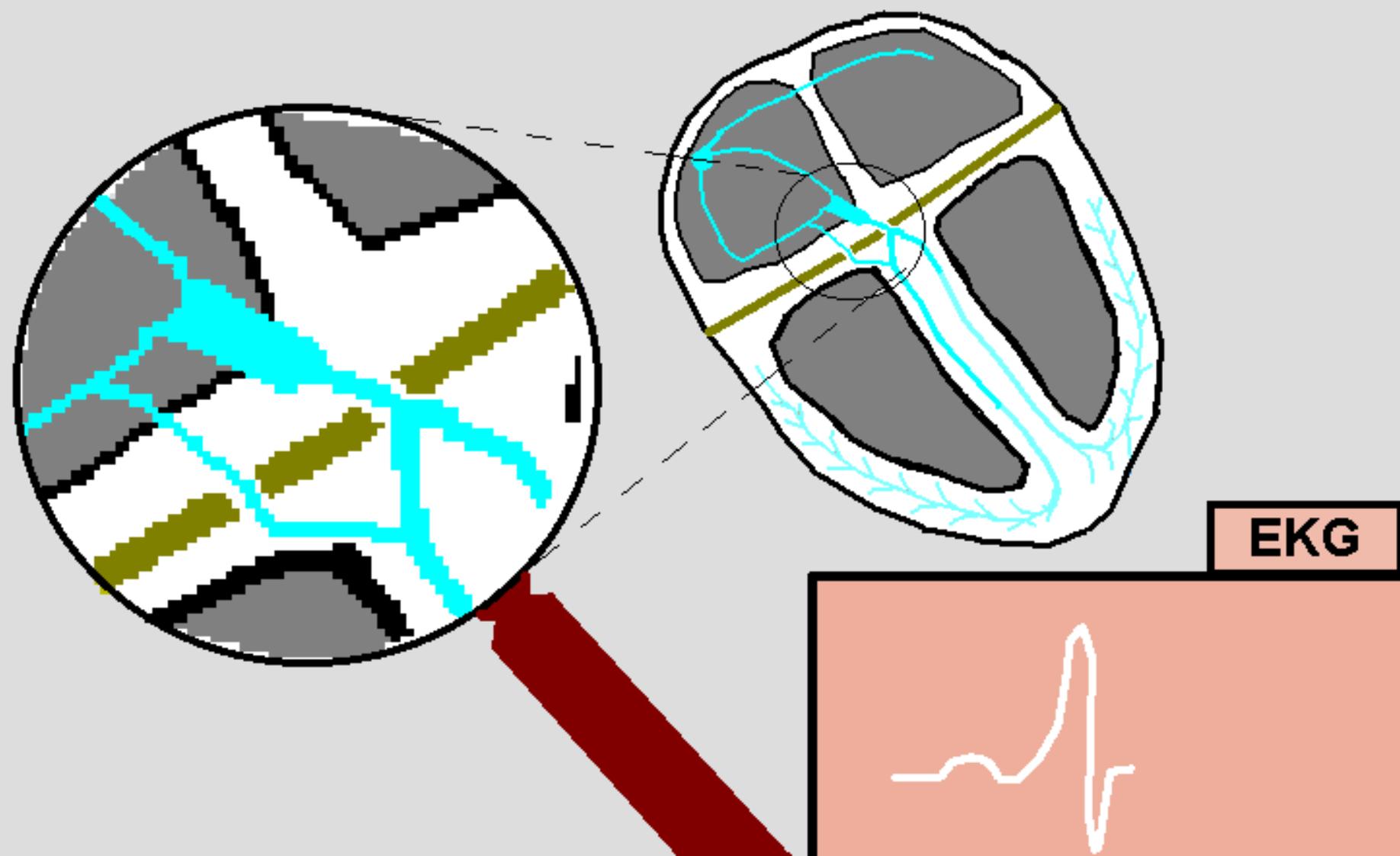
THE CARDIAC ELECTRICAL SYSTEM



THE CARDIAC ELECTRICAL SYSTEM

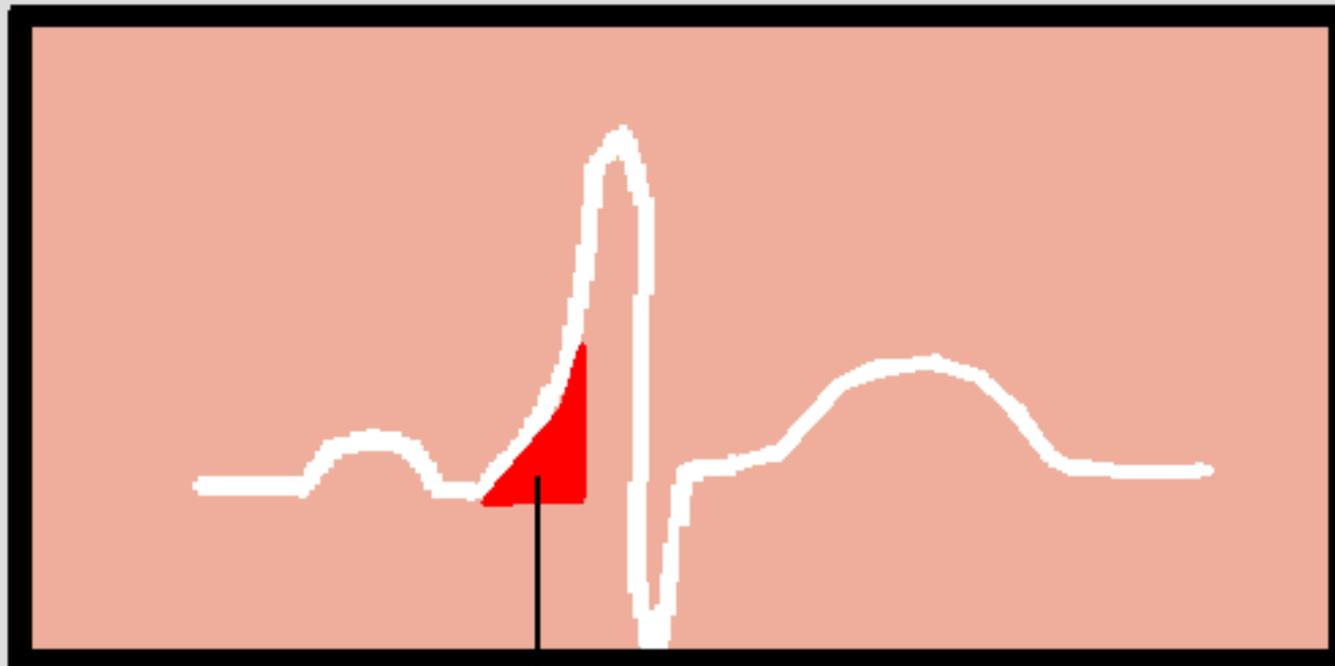


THE CARDIAC ELECTRICAL SYSTEM



WOLFF-PARKINSON-WHITE

EKG CHARACTERISTICS



DELTA
WAVE

This presentation has been prepared by:

Wayne W Ruppert, CVT, CCCC, NREMT-P

For the

Society of Cardiovascular Patient Care's

19th Annual Congress

May 27, 2016

Miami, Florida

Please direct all correspondence to:

Wayne.ruppert@bayfronthealth.com

