

The background of the slide is a blurred ECG (heart rate) monitor. A purple rectangular area highlights a portion of the ECG trace in the upper left quadrant. The text is overlaid on this background.

LIFE THREATENING ARRHYTHMIA AND MANAGEMENT

Corbis

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Introduction

The slide features two ECG waveforms. The top waveform is white on a dark blue background, showing a regular rhythm with distinct P waves, QRS complexes, and T waves. The bottom waveform is green on a dark blue background, showing a similar regular rhythm. A light blue rounded rectangle is centered on the slide, containing the main text.

ECG is the most important diagnostic tools !!!

Life threatening Arrhythmia

- **Lethal:**

VF, VT, PEA, ASYSTOLE

- **Non Lethal:**

TOO FAST or TOO SLOW

ARRHYTHMIA

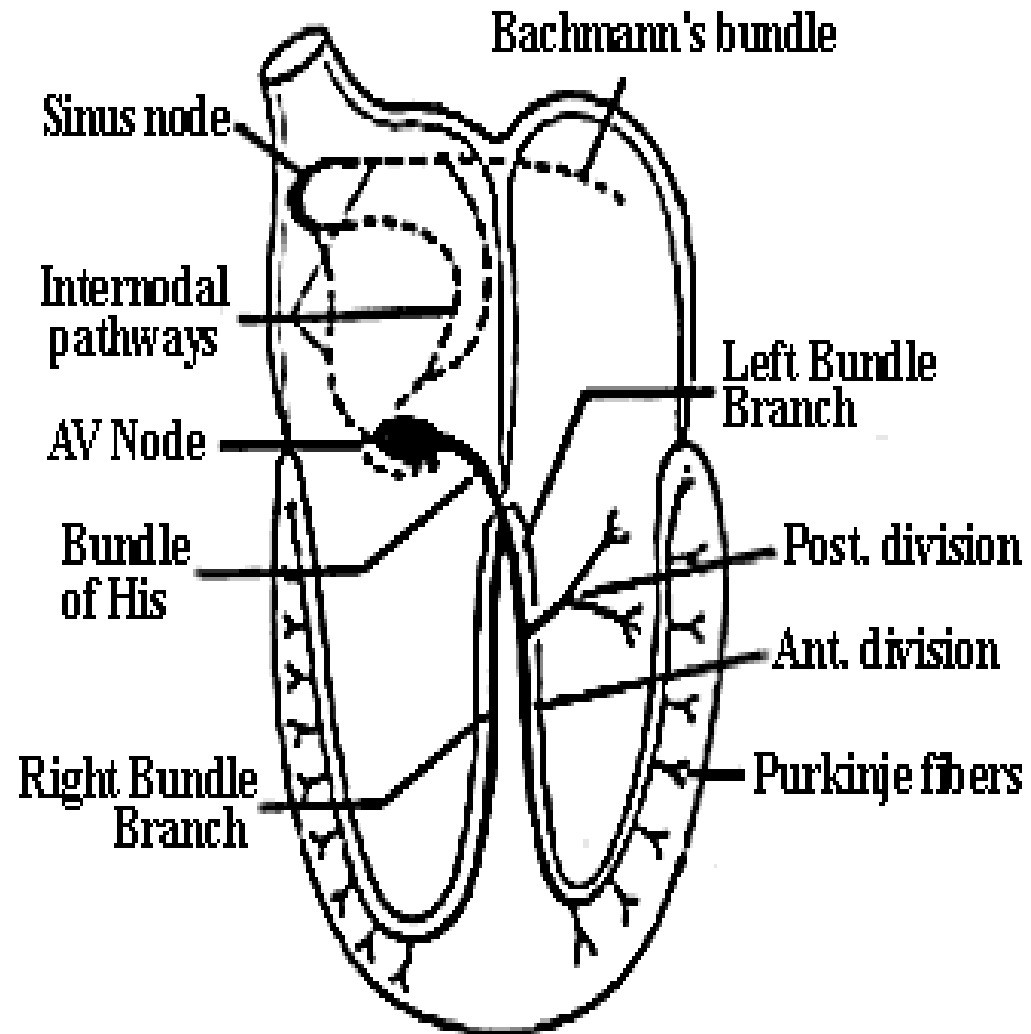
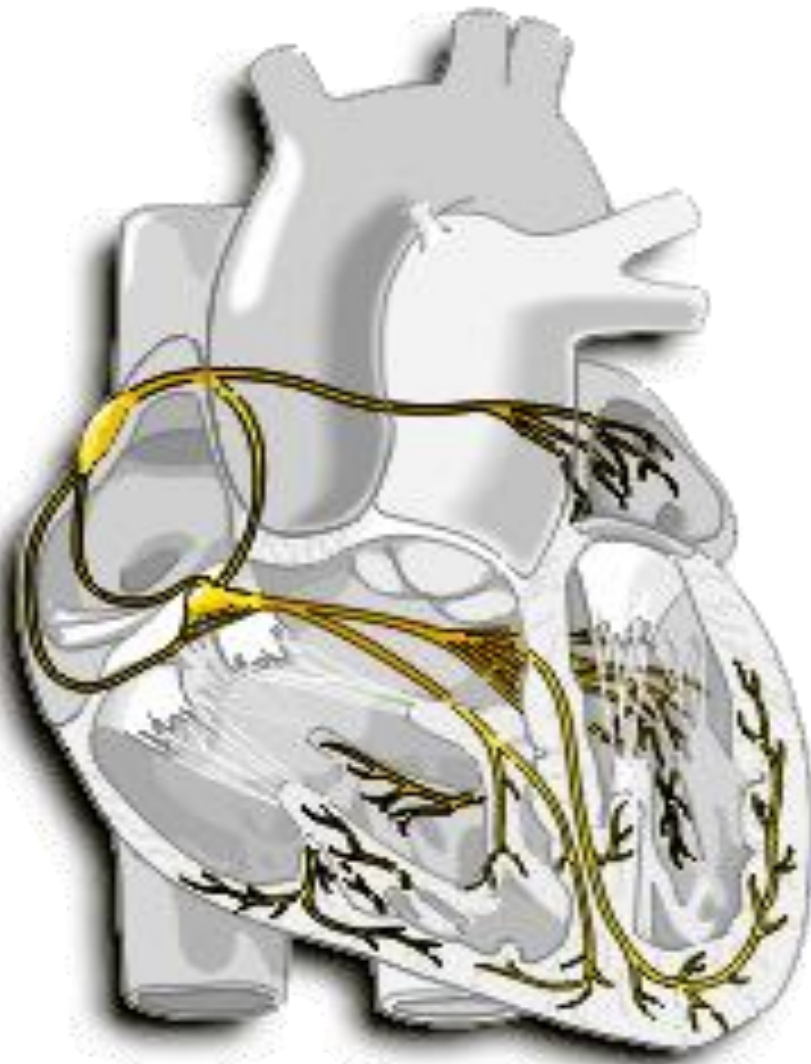
□ Tachyarrhythmias

HR > 100 x/min

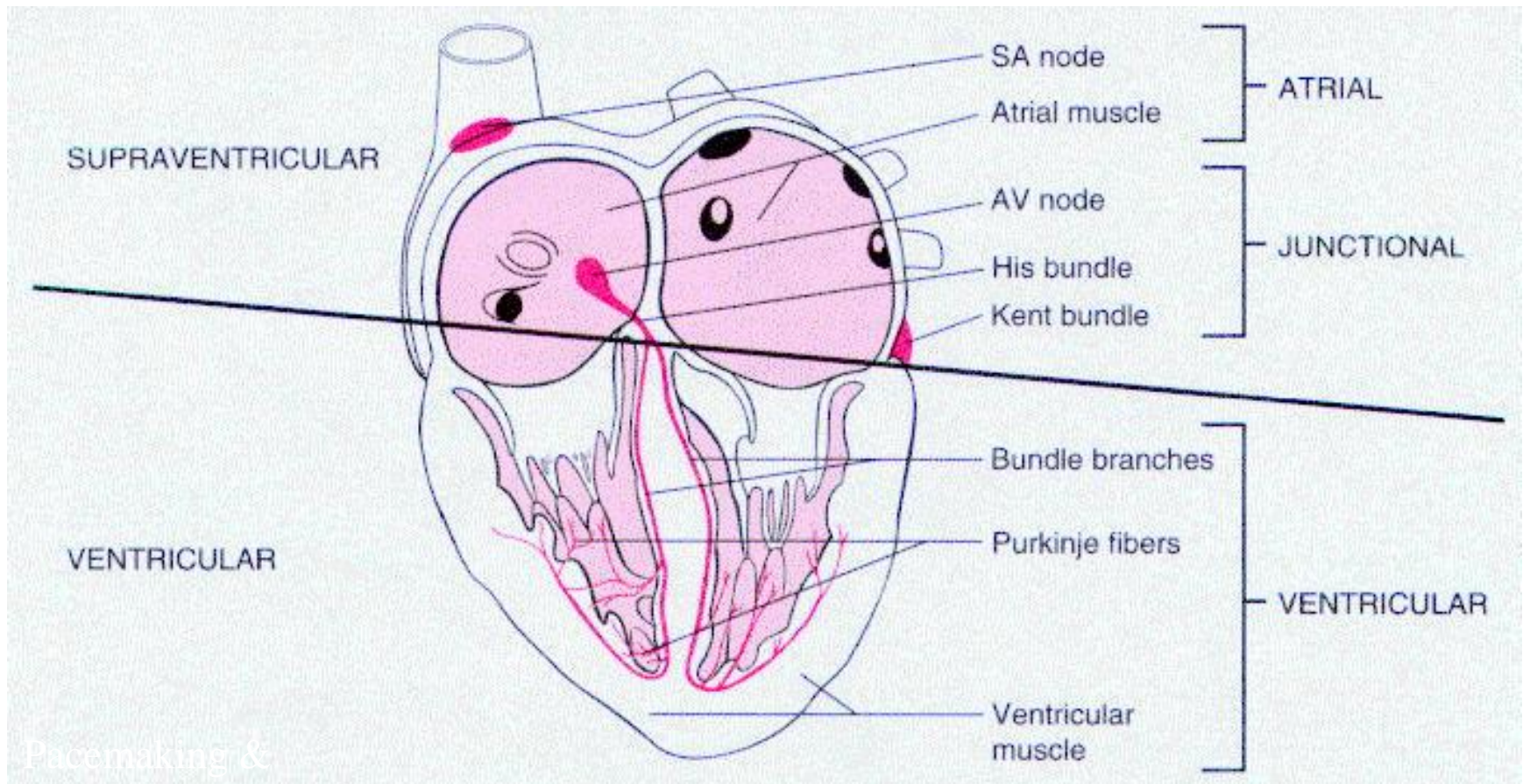
□ Bradiarrhythmias

HR < 60 x/min

Normal Conduction System

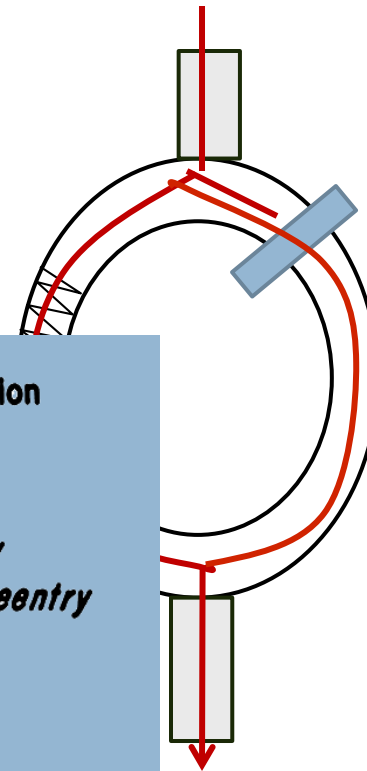
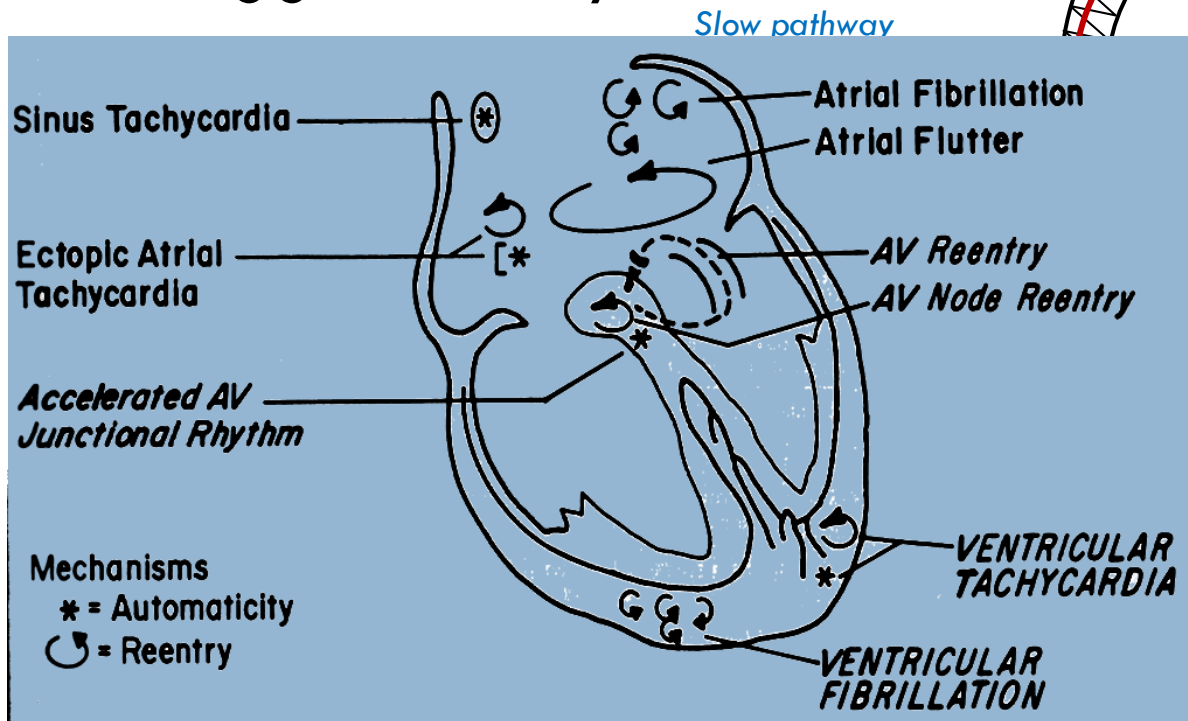


Physiologic Basis of Pacemaker Cells



Mechanisms of Arrhythmia

- Automaticity
- Reentry
- Trigger Activity

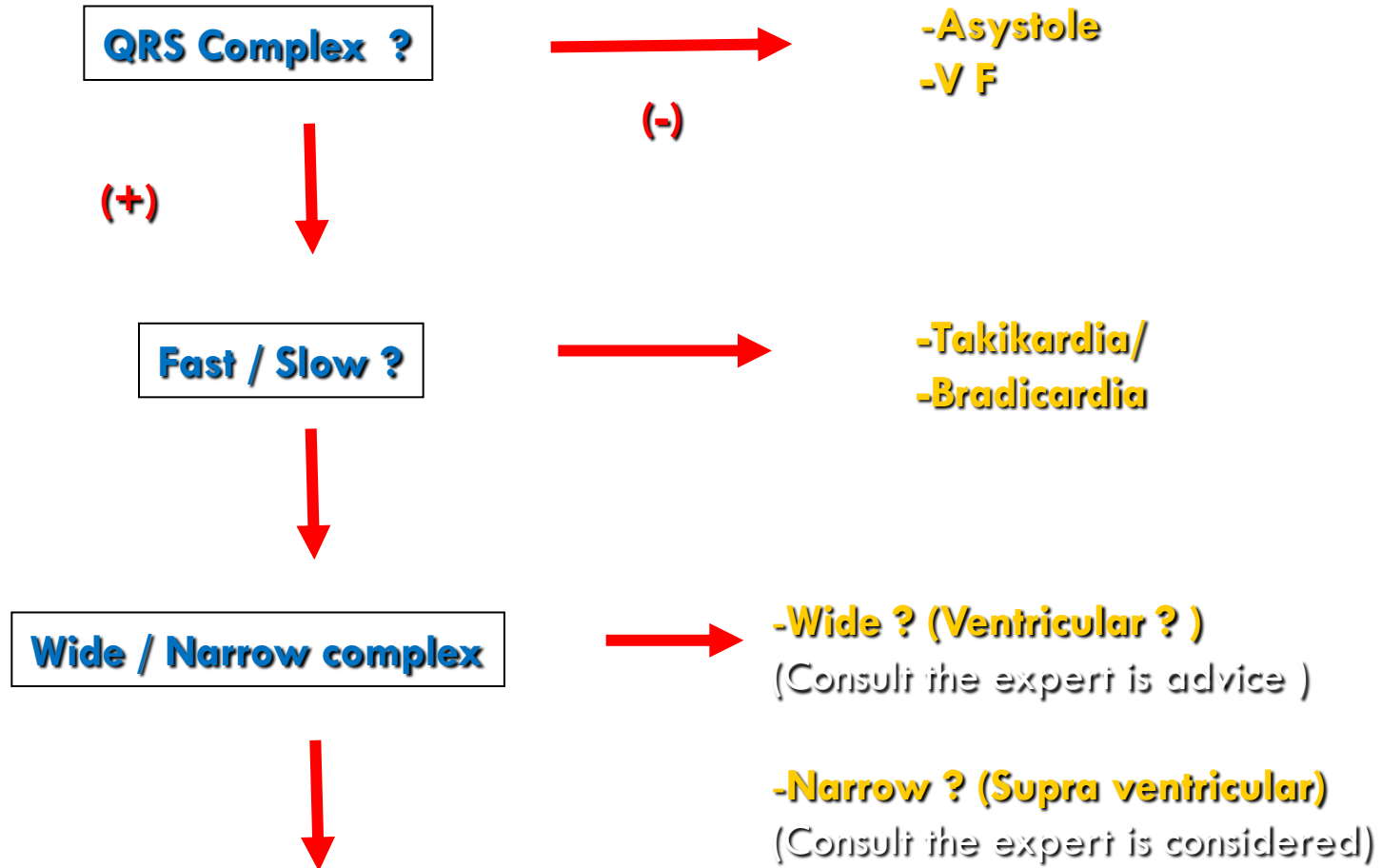


Fast pathway
- hantaran konduksi cepat
- masa refrakter lambat

Principles of Arrhythmia Recognition and Management

- **Treat the Patient ..., not the Monitor !!!!**
- Evaluate the patient's symptoms and clinical signs
 - Ventilation
 - Oxygenation
 - Heart rate
 - Blood pressure
 - Level of consciousness
 - Look for signs of inadequate organ perfusion

HOW TO READ ECG RHYTHM





A flowchart for ECG analysis. It starts with a red arrow pointing down to a box containing the question 'QRS regular /irregular ?'. From this box, a red arrow points right to a list of conditions: 'Irregular : A fib, A flutter, MAT, AF + WPW, multifocal VT,'. Another red arrow points down from the box to a second box containing 'P wave ?'. A third red arrow points down from the second box to a third box containing 'P wave and QRS complex Connection ?'. To the right of the second box is the text 'Normal / abnormal P wave ?'. To the right of the third box are two bullet points: '-1 "P" followed by 1 "QRS" ? / more "P" than "QRS"' and '-Appropriate distance between P wave and QRS complex'. The background features a blue horizontal bar at the top and an orange vertical bar on the left side.

QRS regular /irregular ?

Irregular : A fib, A flutter, MAT,
AF + WPW, multifocal VT,

P wave ?

Normal / abnormal P wave ?

**P wave and QRS complex
Connection ?**

-1 "P" followed by 1 "QRS" ? /
more "P" than "QRS"
-Appropriate distance between
P wave and QRS complex



Tachy-Arrhythmia

Tachy-Arrhythmia

The first step

- Determine if the patient's condition is **stable** or **unstable**

The second step

- Obtain a 12-lead ECG to evaluate the QRS duration (ie, **narrow** or **wide**).

The third step

- Determine if the rhythm is **regular** or **irregular**

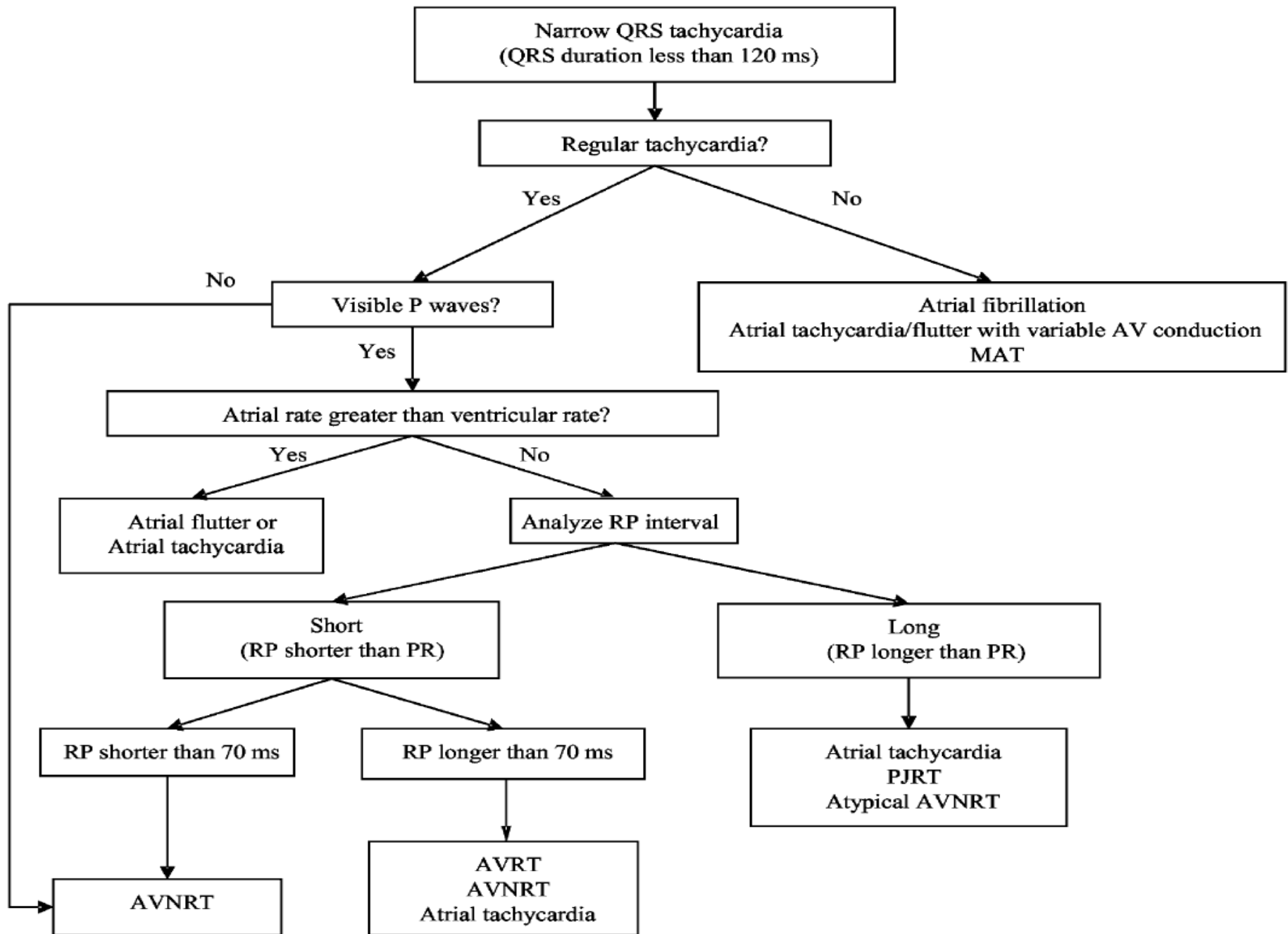
TachyArrhythmia

- If the patient becomes **unstable** at any time, proceed with synchronized cardioversion.
- If the patient develops pulseless arrest or is unstable with polymorphic VT, treat as VF and deliver high-energy unsynchronized shocks (ie, defibrillation doses).

Tachycardia

Narrow–QRS-complex (SVT) tachycardias (QRS <0.12 second) in order of frequency

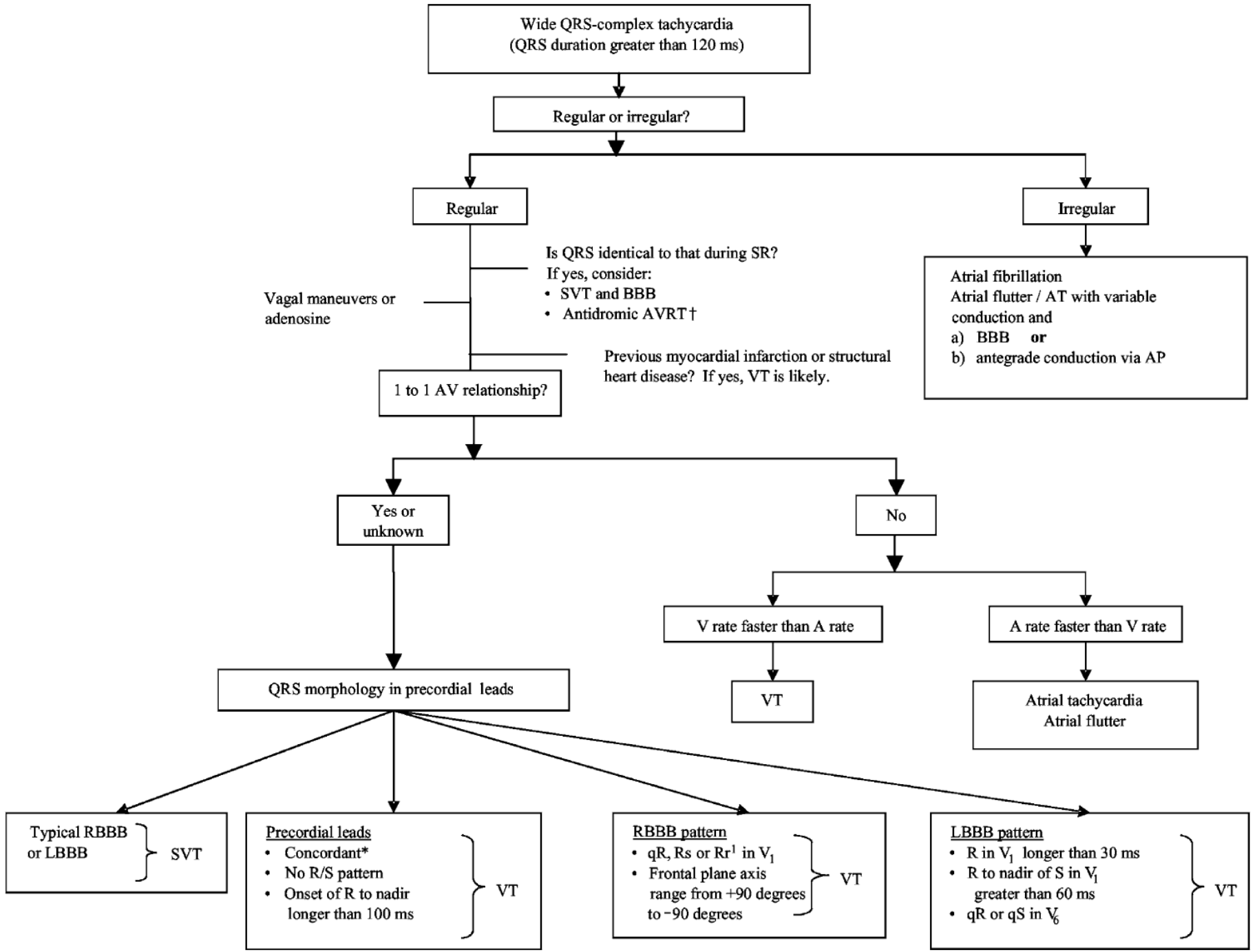
- Sinus tachycardia
- Atrial fibrillation
- Atrial flutter
- AV nodal reentry
- Accessory pathway–mediated tachycardia
- Atrial tachycardia (ectopic and reentrant)
- Multifocal atrial tachycardia (MAT)
- Junctional tachycardia



Tachycardia

Wide-QRS-complex tachycardias ($QRS > 0.12$ second)

- Ventricular tachycardia (VT)
- SVT with aberrancy
- Pre-excited tachycardias (*advanced* recognition rhythms using an accessory pathway)
- Most wide-complex (broad-complex) tachycardias are **ventricular in origin**



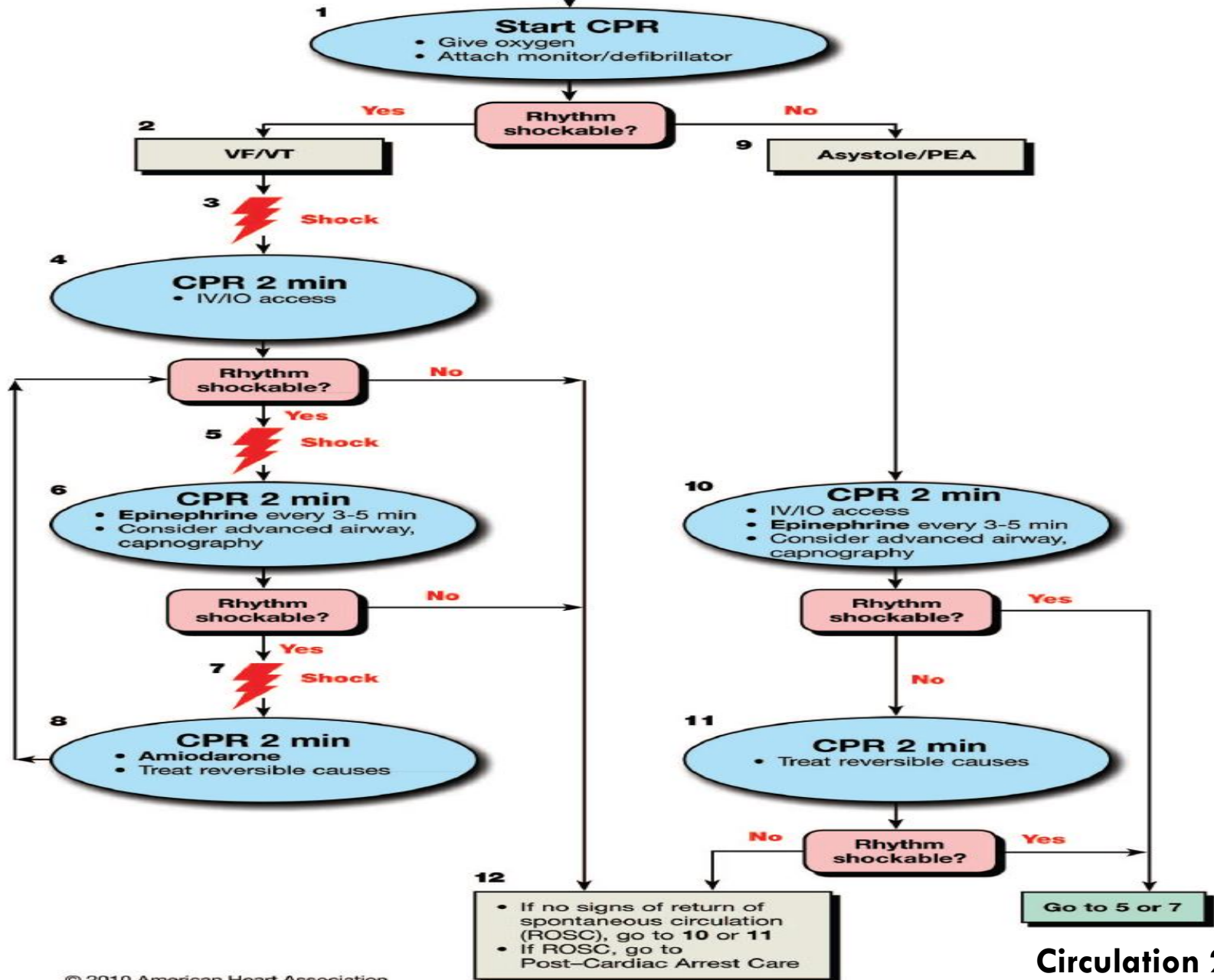
Tachycardia

Initial Evaluation and Treatment of Tachyarrhythmias

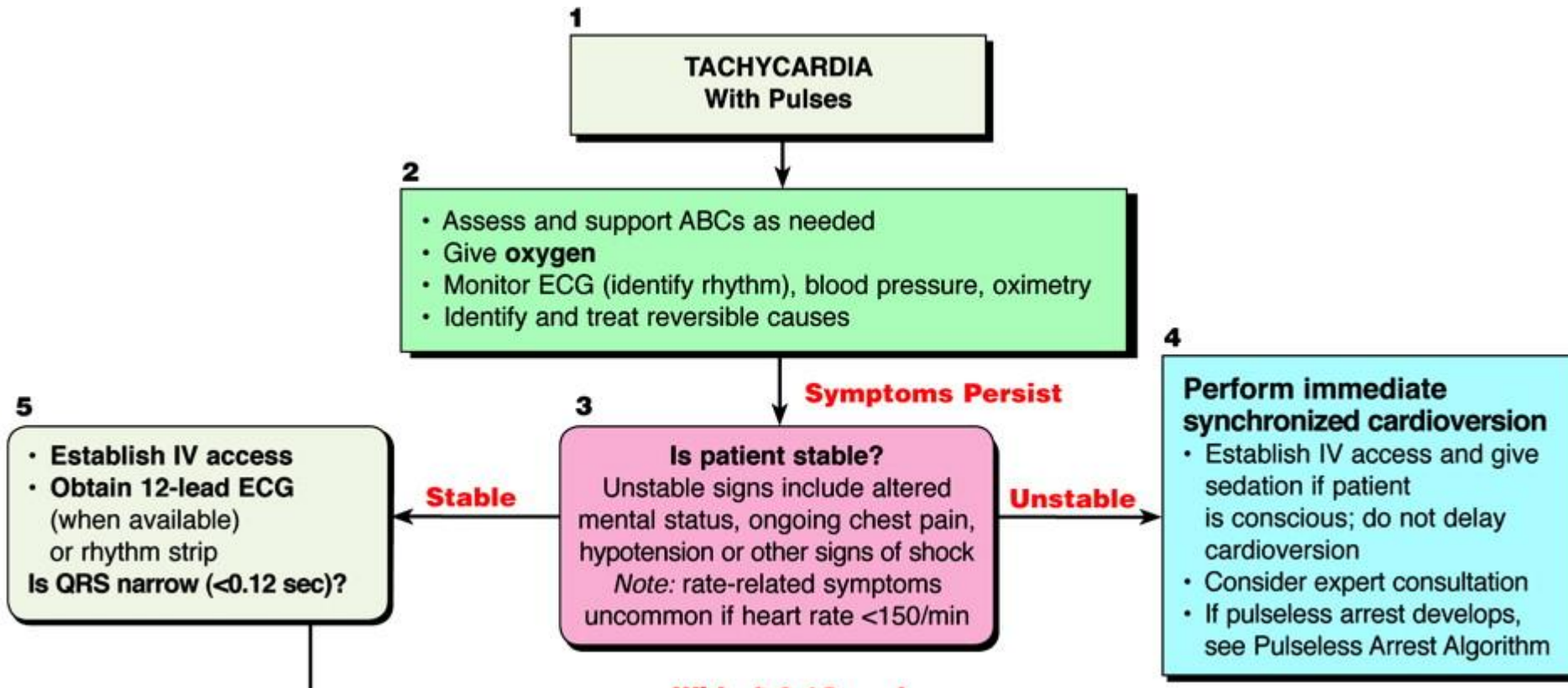
- The evaluation and management of tachyarrhythmias is depicted in the ACLS Tachycardia Algorithm.

Adult Cardiac Arrest

Shout for Help/Activate Emergency Response



ACLS Tachycardia Algorithm



Wide (≥ 0.12 sec)

6 **Narrow**
NARROW QRS*:
Is Rhythm Regular?

Regular

Irregular

12 **WIDE QRS*:**
Is Rhythm Regular?
Expert consultation
advised

Regular

Irregular

7
• Attempt vagal maneuvers
• Give **adenosine** 6 mg rapid IV push. If no conversion, give 12 mg rapid IV push; may repeat 12 mg dose once

11
Irregular Narrow-Complex Tachycardia
Probable **atrial fibrillation** or possible **atrial flutter** or **MAT** (multifocal atrial tachycardia)
• Consider expert consultation
• Control rate (eg, **diltiazem**, **β -blockers**; use β -blockers with caution in pulmonary disease or CHF)

8
Does rhythm convert?
Note: Consider expert consultation

13
If **ventricular tachycardia** or **uncertain rhythm**
Amiodarone
150 mg IV over 10 min
Repeat as needed to maximum dose of 2.2 g/24 hours
• Prepare for elective **synchronized cardioversion**

If **SVT with aberrancy**
• Give **adenosine** (go to Box 7)

14
If **atrial fibrillation with aberrancy**
• See Irregular Narrow-Complex Tachycardia (Box 11)

If **pre-excited atrial fibrillation (AF + WPW)**
• Expert consultation advised
• Avoid AV nodal blocking agents (eg, **adenosine**, **digoxin**, **diltiazem**, **verapamil**)
• Consider antiarrhythmics (eg, **amiodarone** 150 mg IV over 10 min)

If **recurrent polymorphic VT**, seek expert consultation

If **torsades de pointes**, give **magnesium** (load with 1-2 g over 5-60 min, then infusion)

Converts

Does Not Convert

9
If rhythm converts, probable **reentry SVT** (reentry supraventricular tachycardia):
• Observe for recurrence
• Treat recurrence with **adenosine** or longer-acting AV nodal blocking agents (eg, **diltiazem**, **β -blockers**)

10
If rhythm does NOT convert, possible **atrial flutter**, **ectopic atrial tachycardia**, or **junctional tachycardia**:
• Control rate (eg, **diltiazem**, **β -blockers**; use β -blockers with caution in pulmonary disease or CHF)
• Treat underlying cause
• Consider expert consultation

Synchronized Cardioversion and Unsynchronized Shocks

Synchronized cardioversion is recommended to treat

- (1) unstable SVT due to reentry
- (2) unstable atrial fibrillation
- (3) unstable atrial flutter
- (4) unstable monomorphic (regular) VT

Synchronized Cardioversion and Unsynchronized Shocks

- If possible, establish IV access before cardioversion and administer **sedation** if the patient is conscious.
- Consider expert consultation.

Synchronized Cardioversion

Initial recommended doses :

- Narrow regular : 50-100 J
- Narrow irregular : 120-200 J biphasic or 200 J monophasic
- Wide regular : 100 J
- Wide irregular : defibrillation dose (NOT synchronized)

Cardioversion

Cardioversion is **not** likely to be effective for treatment of

- Junctional tachycardia
- Ectopic or multifocal atrial tachycardia
 - ▣ these rhythms have an **automatic focus**, arising from cells that are spontaneously depolarizing at a rapid rate
 - ▣ shock delivery to a heart with a rapid automatic focus may increase the rate of the tachyarrhythmia



Brady-Arrhythmia

Bradycardia

- Defined as a heart rate of <60 beats per minute
- A slow heart rate may be physiologically normal for some patients
- While initiating treatment, evaluate the clinical status of the patient and identify potential reversible causes

Bradycardia

- Identify signs and symptoms of poor perfusion and determine if those signs are likely to be caused by the bradycardia
 - ▣ hypotension
 - ▣ acute altered mental status
 - ▣ Chest pain
 - ▣ congestive heart failure
 - ▣ seizures
 - ▣ syncope
 - ▣ other signs of shock related to the bradycardia

Bradycardia

- Bradycardia :
 - ▣ Profound sinus bradikardia, SA block
 - ▣ Junctional rhythm
 - ▣ AV block
- Causes of bradycardia:
 - ▣ medications
 - ▣ electrolyte disturbances
 - ▣ structural problems resulting from acute myocardial infarction and myocarditis.

Bradycardia Algorithm

1

BRADYCARDIA
Heart rate <60 bpm and
inadequate for clinical condition

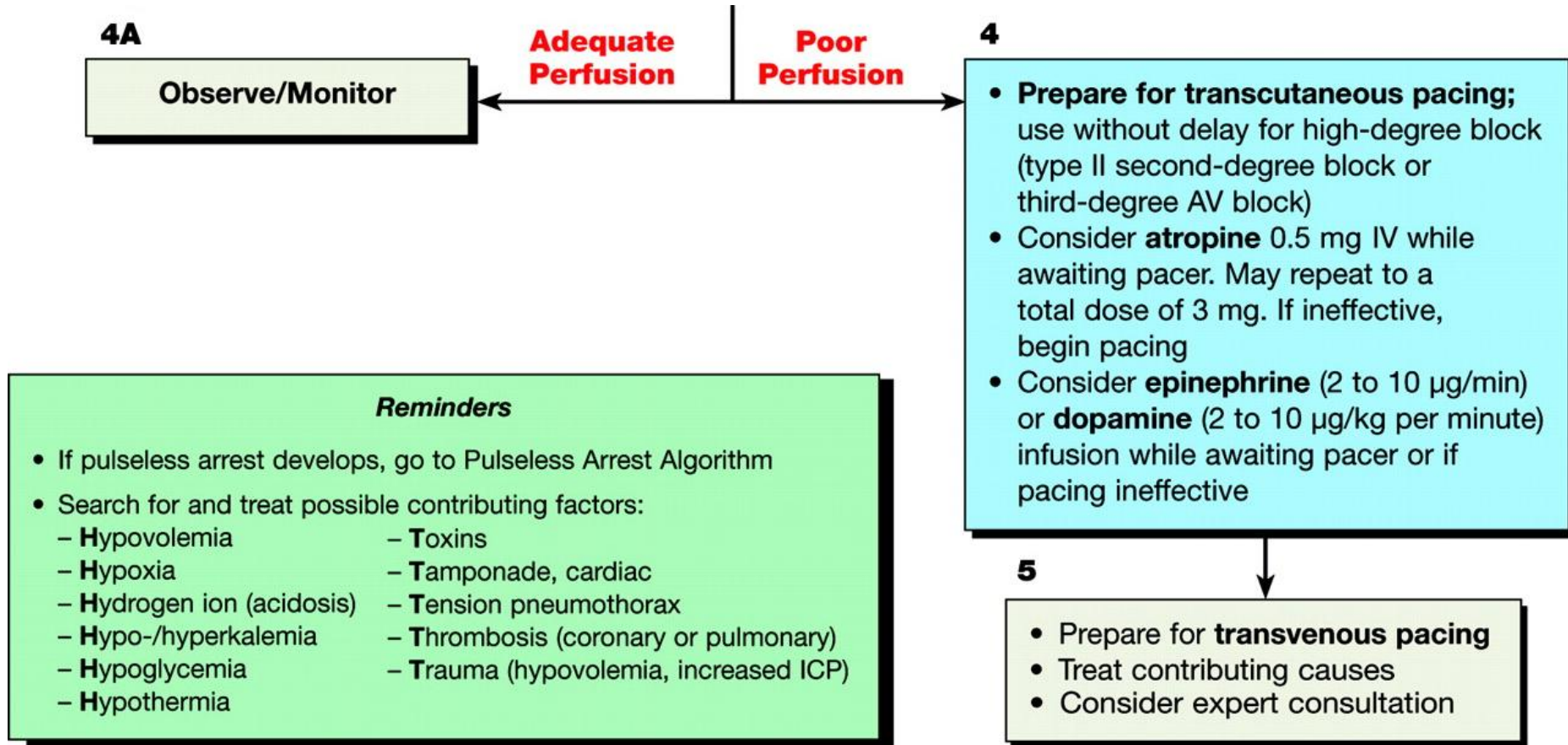
2

- Maintain patent **airway**; assist **breathing** as needed
- Give **oxygen**
- Monitor ECG (identify rhythm), blood pressure, oximetry
- Establish IV access

3

Signs or symptoms of poor perfusion caused by the bradycardia?
(eg, acute altered mental status, ongoing chest pain, hypotension or other signs of shock)

Bradycardia Algorithm



Therapy

Atropine

- First-line drug for acute symptomatic bradycardia (Class IIa)
- Improved heart rate and signs and symptoms associated with bradycardia
- Useful for treating symptomatic sinus bradycardia and may be beneficial for any type of AV block **at the nodal level.**

Therapy

Atropine

- The recommended dose for bradycardia is **0.5 mg** IV every 3 to 5 minutes to a maximum total dose of **3 mg**.
- Doses <0.5 mg may paradoxically result in further slowing of the heart rate.
- Atropine administration should not delay implementation of external pacing for patients with poor perfusion.

Therapy

Atropine

- Use cautiously in the presence of **acute coronary ischemia or myocardial infarction**; increased heart rate may worsen ischemia or increase the zone of infarction.
- Atropine may be used with caution and appropriate monitoring following **cardiac transplantation**. It will likely be **ineffective** because the transplanted heart **lacks vagal innervation**.

Therapy

Pacing (Transcutaneous pacing, **TCP**)

- **Class I** intervention for symptomatic bradycardias
- Indication : started immediately for patients
 - ▣ Unstable, particularly those with high-degree block
 - ▣ If there is no response to atropine
 - ▣ If atropine is unlikely to be effective
 - ▣ If the patient is severely symptomatic

Therapy

Pacing (Transcutaneous pacing, TCP)

- Can be painful and may fail to produce effective mechanical capture
- Use **analgesia** and **sedation** for pain control
- Verify mechanical capture and re-assess the patient's condition
- If TCP is ineffective (eg, inconsistent capture)
 - ▣ prepare for **transvenous pacing**
 - ▣ consider obtaining **expert consultation**

Therapy

Alternative Drugs to Consider

- **Second-line** agents for treatment of symptomatic bradycardia
- They may be considered when the bradycardia is unresponsive to atropine and as temporizing measures while awaiting the availability of a pacemaker.

Epinephrine

- Used for patients with symptomatic bradycardia or hypotension after atropine or pacing fails (**Class IIb**).
- Begin the infusion at **2 to 10 $\mu\text{g}/\text{min}$** and titrate to patient response.
- Assess intravascular volume and support as needed.

Dopamine

- Both α - and β -adrenergic actions
- Dopamine infusion (at rates of 2 to 10 $\mu\text{g}/\text{kg}$ per minute) can be added to epinephrine or administered alone.
- Titrate the dose to patient response.
- Assess intravascular volume and support as needed.



Thank you for your attention !!