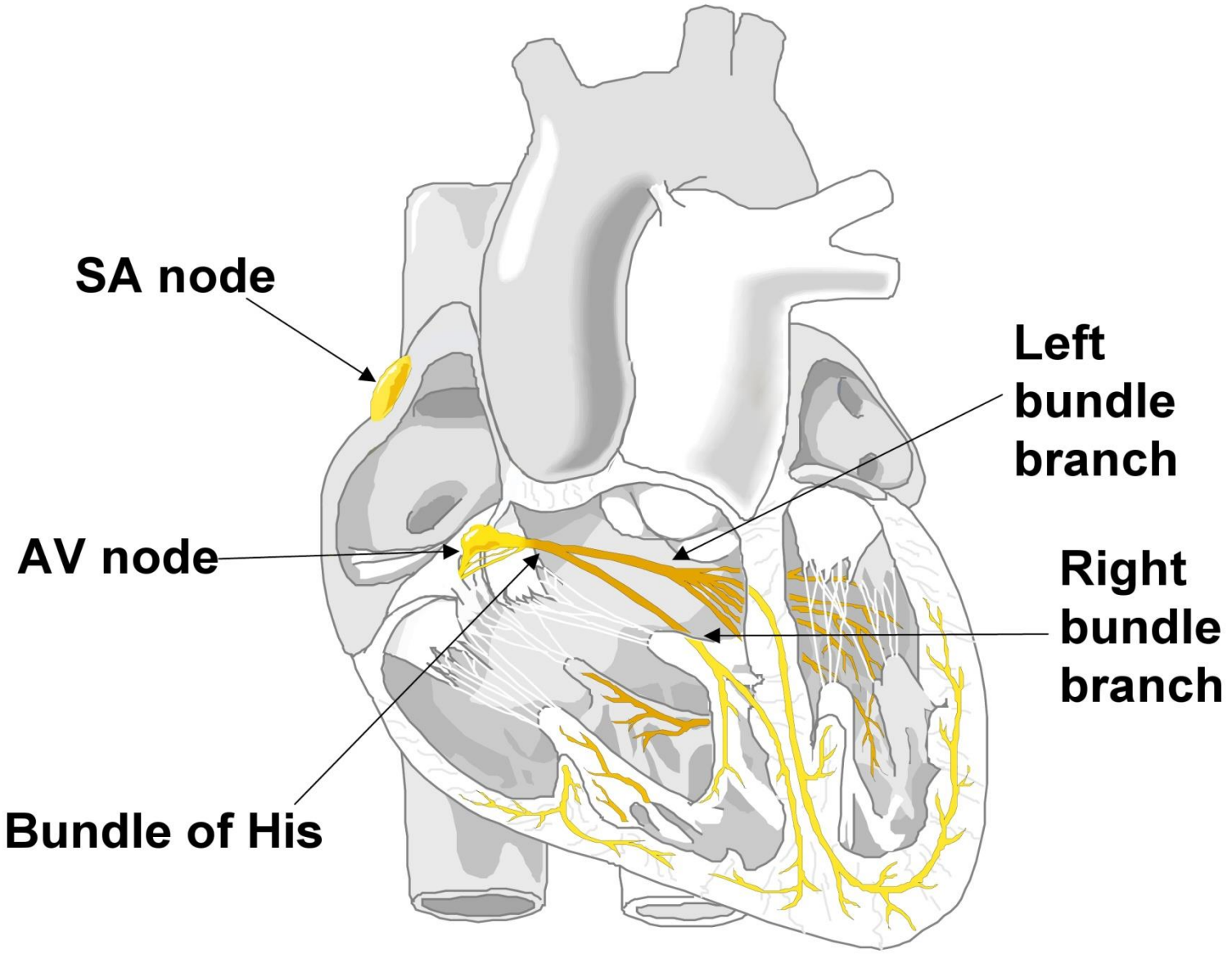
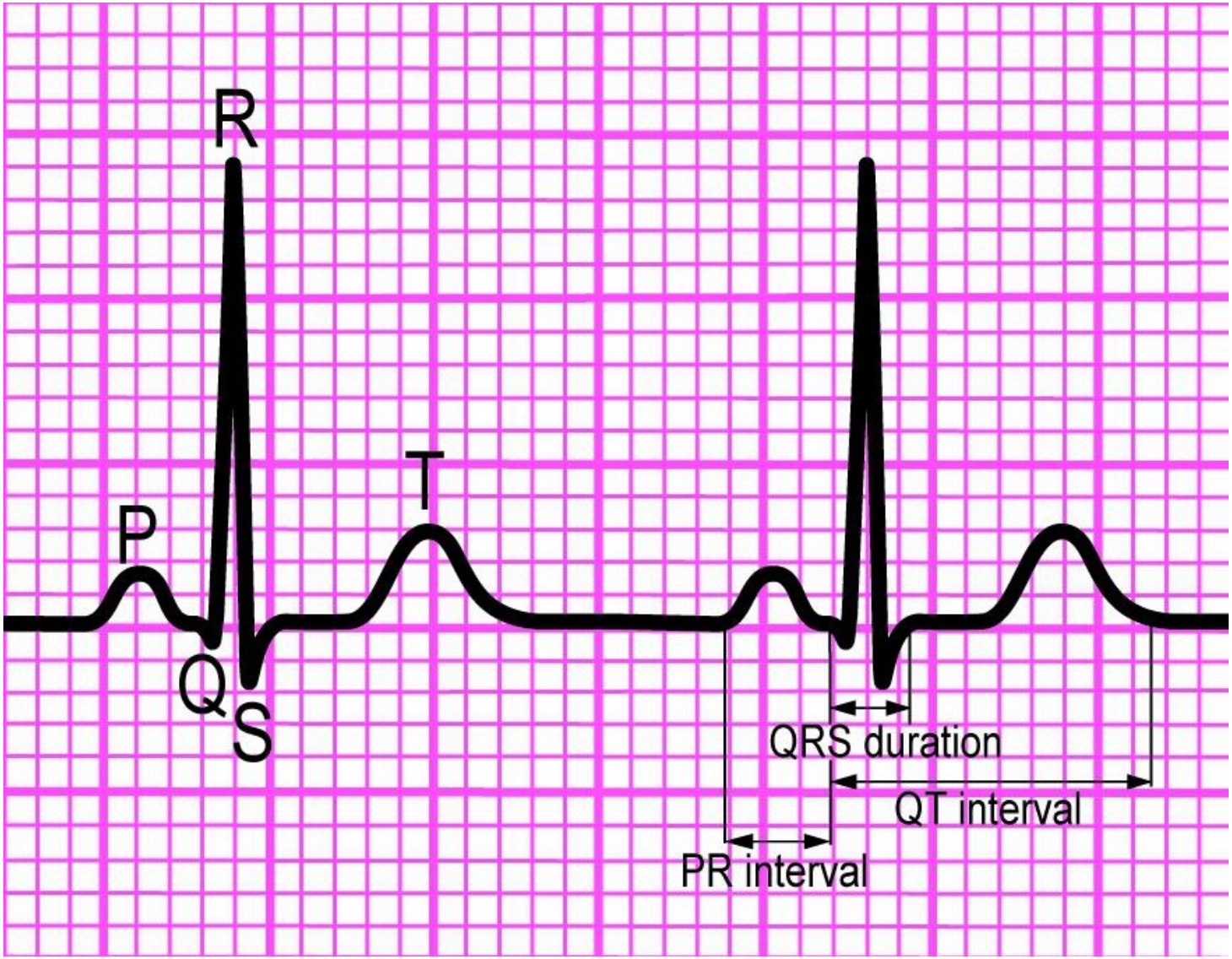
Tachycardia, Cardioversion and Drugs

Learning outcomes

At the end of this workshop you should:

- Be able to recognise types of tachycardia, defined by regularity and QRS width
- Understand the principles of treatment
- Know the indications for electrical and chemical cardioversion
- Know how to perform synchronised cardioversion


SA node
Left bundle branch
AV node
Right bundle branch
Bundle of His


R
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QRS duration
QT interval
PR interval

How to read a rhythm strip

1. Is there any electrical activity?

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3. Is the QRS rhythm regular or irregular?

4. Is the QRS width normal (narrow) or broad?

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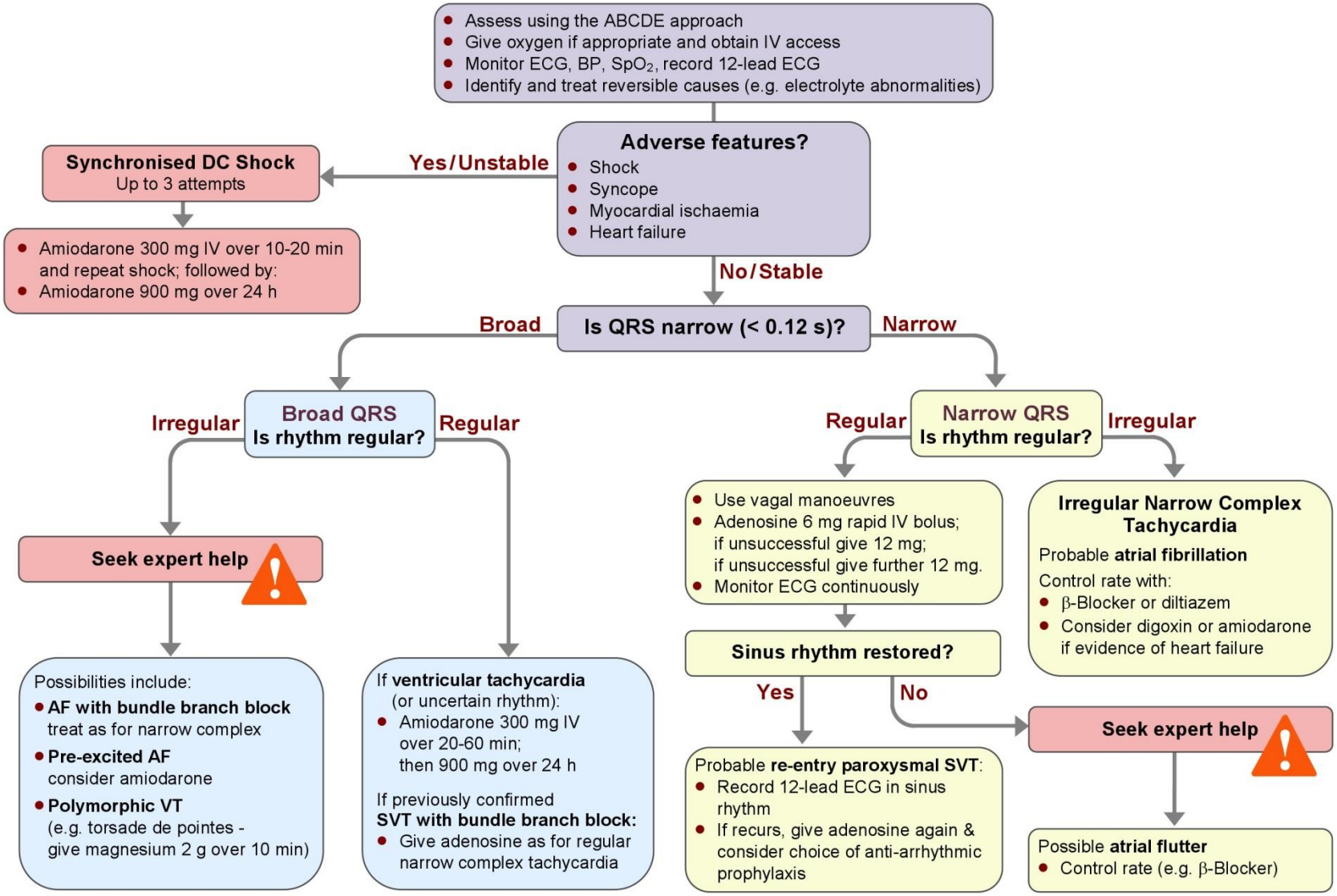
5. Is atrial activity present?
   (If so, what is it: P waves? Other atrial activity?)
6. How is atrial activity related to ventricular activity?

Tachycardia algorithm (with pulse)



Tachycardia algorithm

- Assess using the ABCDE approach
- Give oxygen if appropriate and obtain IV access
- Monitor ECG, BP, SpO_2, record 12 lead ECG
- Identify and treat reversible causes (e.g. electrolyte abnormalities)

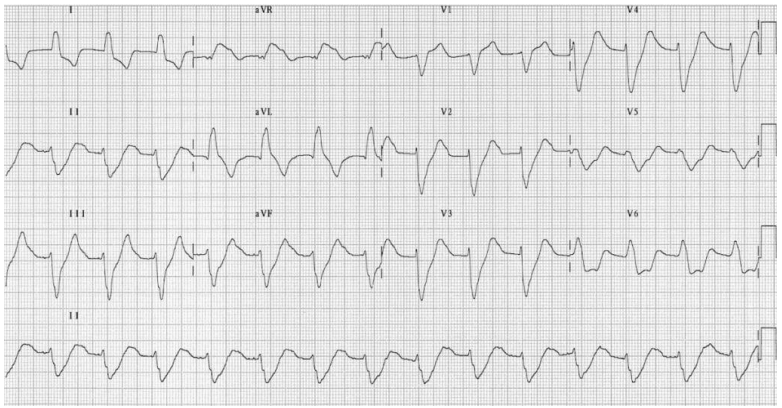
Adverse features?

- Shock
- Syncope
- Myocardial ischaemia
- Heart failure

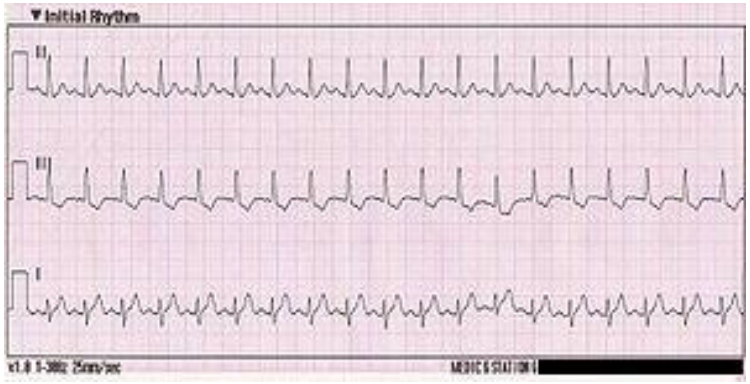
Yes/Unstable

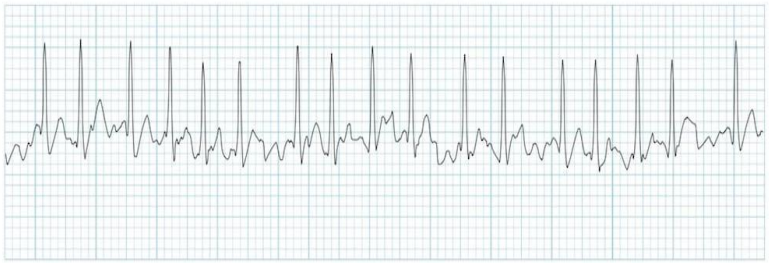
Synchronised DC Shock
Up to 3 attempts

- Amiodarone 300 mg IV over 10-20 min and repeat shock; followed by:
- Amiodarone 900 mg over 24 h



Stable narrow-complex tachycardia





Is QRS narrow (< 0.12 s)? — Narrow

Narrow QRS
Is rhythm regular?

Regular

- Use vagal manoeuvres
- Adenosine 6 mg rapid IV bolus; if unsuccessful give 12 mg; if unsuccessful give further 12 mg.
- Monitor ECG continuously

Sinus rhythm restored?

Yes

Probable **re-entry paroxysmal SVT**:
- Record 12-lead ECG in sinus rhythm
- If recurs, give adenosine again & consider choice of anti-arrhythmic prophylaxis

No

Seek expert help

Possible **atrial flutter**
- Control rate (e.g. β-Blocker)

Irregular

Irregular Narrow Complex Tachycardia

Probable **atrial fibrillation**

Control rate with:
- β-Blocker or diltiazem
- Consider digoxin or amiodarone if evidence of heart failure

Stable broad-complex tachycardia

Is QRS narrow (< 0.12 s)?

Broad

Broad QRS
Is rhythm regular?

Irregular

Regular

Seek expert help

Possibilities include:

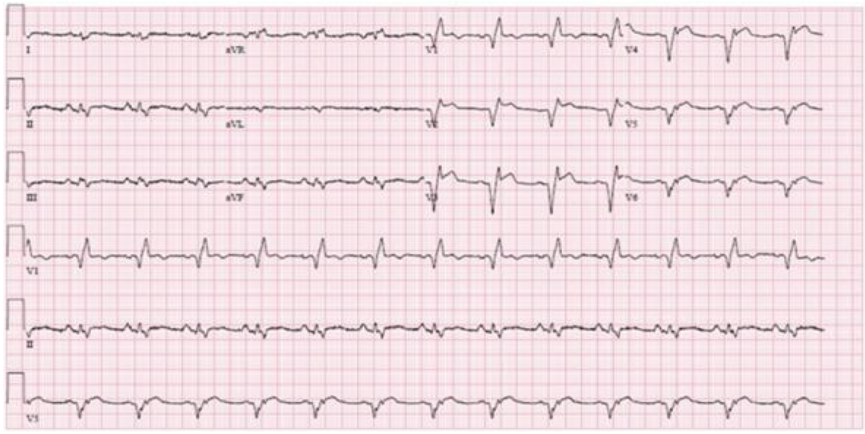
- **AF with bundle branch block**
  treat as for narrow complex
- **Pre-excited AF**
  consider amiodarone
- **Polymorphic VT**
  (e.g. torsade de pointes -
  give magnesium 2 g over 10 min)

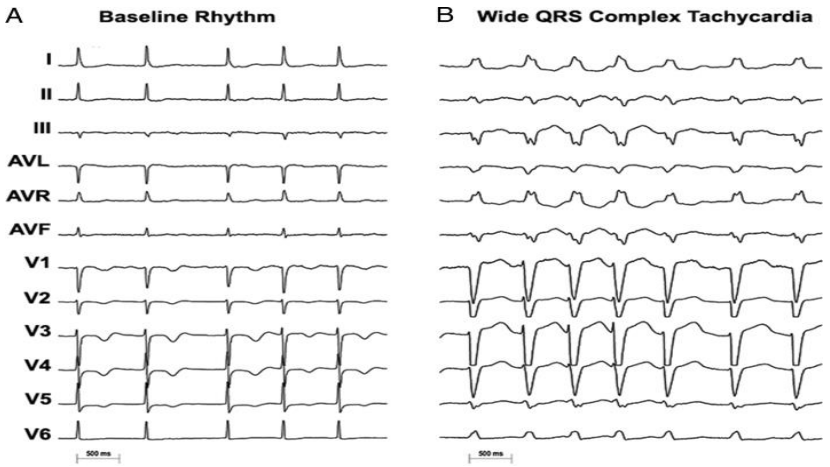
If **ventricular tachycardia**
(or uncertain rhythm):

- Amiodarone 300 mg IV
  over 20-60 min;
  then 900 mg over 24 h

If previously confirmed
SVT with bundle branch block:

- Give adenosine as for regular
  narrow complex tachycardia





Case study 1

Clinical setting and history

- 65-year-old woman
- In monitored bed 3 days after anterior myocardial infarction
- Complains to nurse of feeling unwell

Clinical course

- ABCDE
  - A : Clear
  - B : Spontaneous breathing, rate 26 min^{-1}
  - C : Looks pale, HR 180 min^{-1}, BP 70/42 mmHg, CRT 3 s

  Initial rhythm?
  - D : Alert, glucose 5.6 mmol l^{-1}
  - E : Nil of note

What action will you take?

Case study 2

Clinical setting and history

- 48-year-old woman admitted to ED
- History of palpitation over past 12 h

Clinical course

- ABCDE
  - A : Clear
  - B : Spontaneous breathing, rate 16 min^{-1}
  - C : P 180 min^{-1}, BP 110/90 mmHg, CRT < 2 s

Initial rhythm?

  - D : Alert, glucose 5.5 mmol l^{-1}
  - E : Nil of note

What action will you take?

Case study 2 (continued)

Clinical course

- No response to vagal manoeuvres
- Vital signs unchanged

What action will you take now?

Case study 2 (continued)

Adenosine

Indications

- Narrow-complex tachycardia
- Regular broad-complex tachycardia of uncertain nature
- Broad-complex tachycardia only if previously confirmed SVT with bundle branch block

Contraindications

- Asthma

Dose

- 6 mg bolus by rapid IV injection
- Up to 2 doses of 12 mg if needed

Actions

- Blocks conduction through AV node

Case study 2 (continued)

Amiodarone

Indications

- Broad-complex and narrow-complex tachycardia

Dose

- 300 mg over 20-60 min IV
- 900 mg infusion over 24 h
- Preferably via central venous catheter

Actions

- Lengthens duration of action potential
- Prolongs QT interval
- May cause hypotension

Case study 3

Clinical setting and history

- 76-year-old man
- History of hypertension treated with a diuretic
- In the recovery area after an uncomplicated hernia repair
- Nurses report the sudden onset of tachycardia

Clinical course

- ABCDE
  - A : Clear
  - B : Spontaneous breathing, rate 18 min^{-1}
  - C : P 170 min^{-1}, BP 100/60 mmHg, CRT < 2 s

  Initial rhythm?
  - D : Alert, glucose 4.0 mmol l^{-1}
  - E : Nil of note

What action will you take?

Case study 3 (continued)

Clinical course

- Patient is given IV metoprolol
- 30 min later, he complains of chest discomfort
- ABCDE
  - A : Clear
  - B : Spontaneous breathing, rate 24 min^{-1}
  - C : HR 170 min^{-1}, BP 85/50 mmHg, CRT 4 s

  What is the rhythm?

What action will you take?

Case study 3 (continued)

Clinical course

- Cardioversion restores sinus rhythm
- Patient is transferred back to the day-case unit

What actions may be required as part of discharge planning?

Any questions?

Summary

You should now:

- Be able to recognise types of tachycardia, defined by regularity and QRS width
- Understand the principles of treatment
- Know the indications for electrical and chemical cardioversion
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Advanced Life Support Course

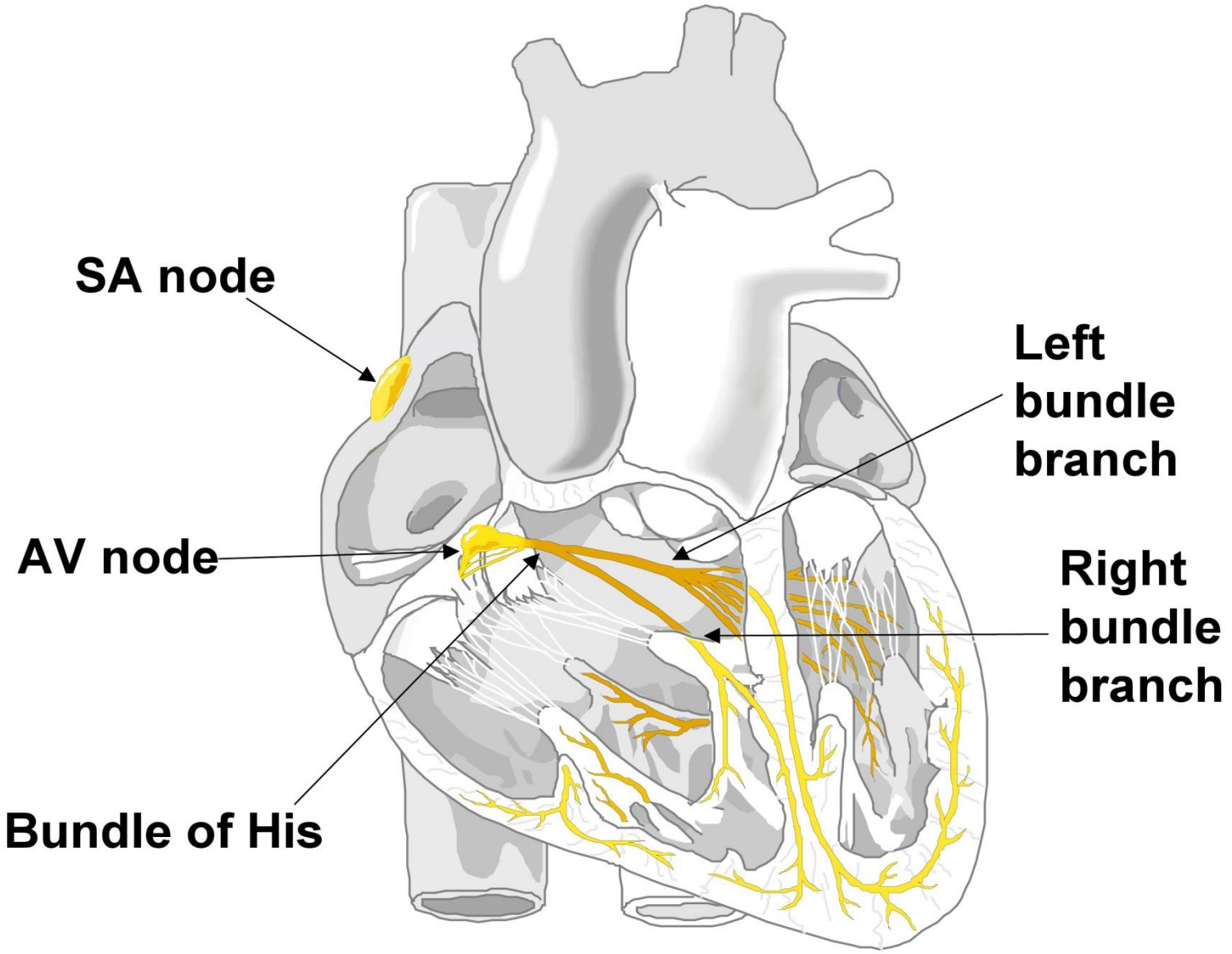
Slide set

Bradycardia,
Cardiac Pacing and Drugs

Learning outcomes

At the end of this workshop you should:

- Be able to recognise bradycardia and differentiate between the different degrees of heart block
- Understand the principles of treating bradycardia
- Understand the indications for cardiac pacing
- Be aware of the different methods available for cardiac pacing
- Know how to apply non-invasive, transcutaneous electrical pacing safely and effectively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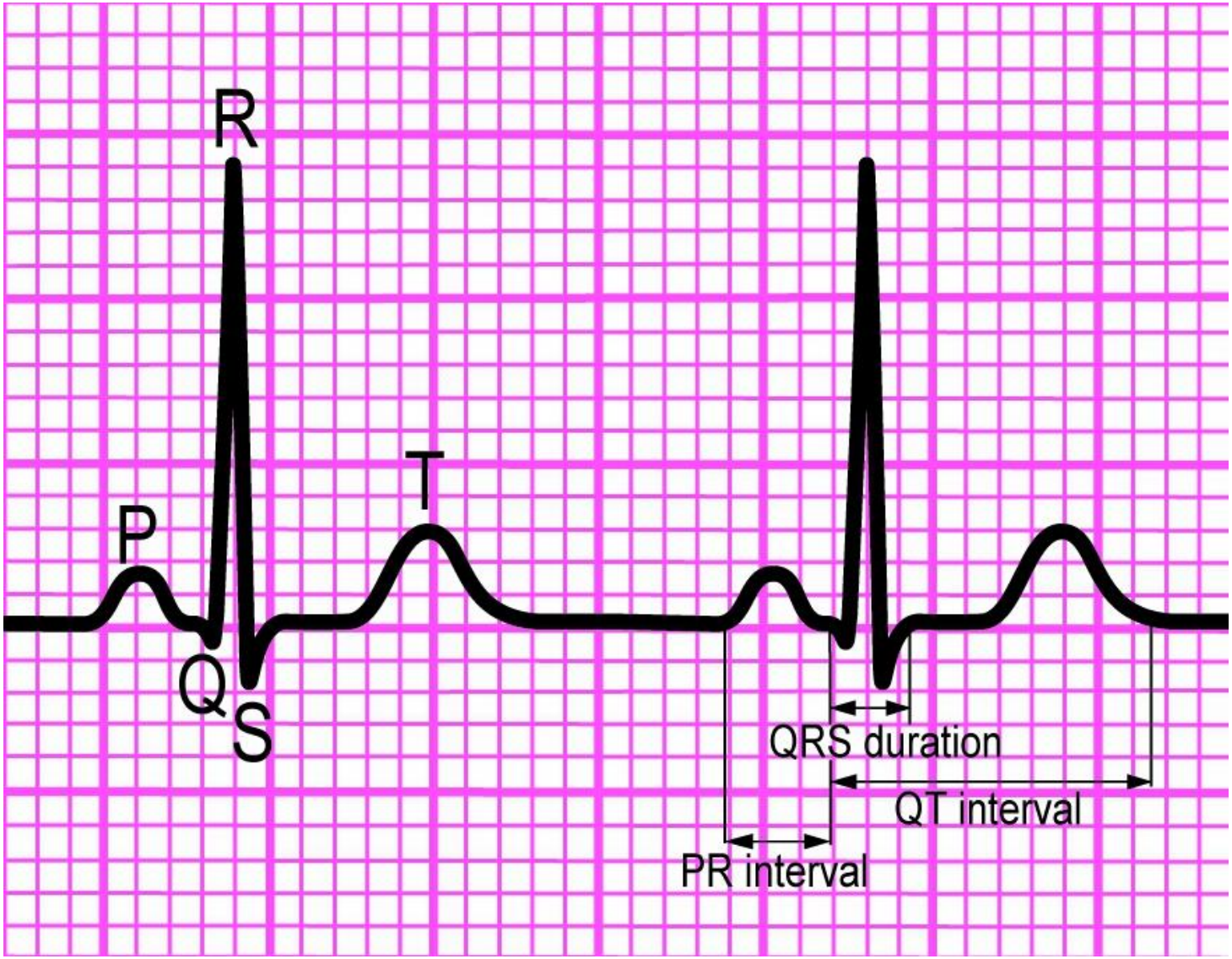
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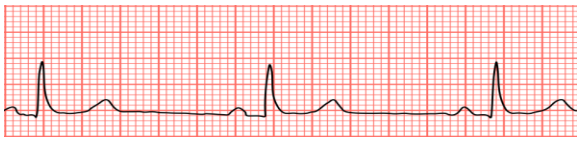
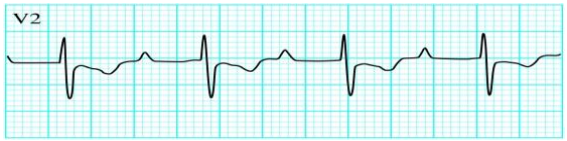
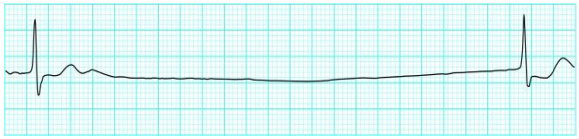
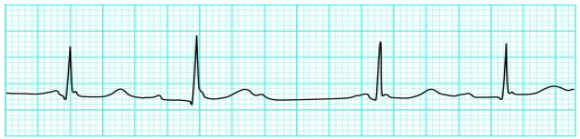
Bradycardia algorithm

Includes rates inappropriately slow for haemodynamic state









- Assess using the ABCDE approach
- Give oxygen if appropriate and obtain IV access
- Monitor ECG, BP, SpO_2, record 12-lead ECG
- Identify and treat reversible causes (e.g. electrolyte abnormalities)

Adverse features?

YES
- Shock
- Syncope
- Myocardial ischaemia
- Heart failure

NO

Atropine
500 mcg IV

Satisfactory response?

YES

NO

Risk of asystole?

YES
- Recent asystole
- Mobitz II AV block
- Complete heart block with broad QRS
- Ventricular pause > 3 s

NO

Interim measures:
- Atropine 500 mcg IV repeat to maximum of 3 mg
- Isoprenaline 5 mcg min^{-1} IV
- Adrenaline 2-10 mcg min^{-1} IV
- Alternative drugs *

OR
- Transcutaneous pacing

Seek expert help
Arrange transvenous pacing

Observe

***Alternatives include:**
- Aminophylline
- Dopamine
- Glucagon (if beta-blocker or calcium channel blocker overdose)
- Glycopyrrolate can be used instead of atropine

Case study

Clinical setting and history

- 60-year-old man referred to admissions unit by GP
- Long-term history of heart disease
- Feeling light-headed and breathless

Clinical course

- ABCDE
  - A : Clear
  - B : Spontaneous breathing, rate 18 min^{-1}
  - C : Looks pale, P 45 min^{-1}, BP 90/50 mmHg, CRT 3 s

Initial rhythm?

  - D : Alert, glucose 4.5 mmol l^{-1}
  - E : Nil of note

What action will you take?

Case study (continued)

Clinical course

- No response to atropine
- Patient becomes more breathless, cold, clammy and mildly confused
- Change in rhythm
- ABCDE
  - A : Clear
  - B : Spontaneous breathing, rate 24 min^{-1}
    widespread crackles on auscultation
  - C : Looks pale, HR 35 min^{-1}, BP 80/50 mmHg, CRT 4 s
  - D : Responding to verbal stimulation
  - E : Nil of note

What will you do now?

Case study (continued)

- Consider need for expert help
- Prepare for transcutaneous pacing
- Consider percussion pacing as interim measure
- Confirm electrical capture and mechanical response once transcutaneous pacing has started

Case study (continued)

Atropine

Indication

- Symptomatic bradycardia

Contraindication

- Do not give to patients who have had a cardiac transplant

Dose

- 500 mcg IV, repeated every 3 - 5 min to maximum of 3 mg

Actions

- Blocks vagus nerve
- Increases sinus rate
- Increases atrioventricular conduction

Side effects

- Blurred vision, dry mouth, urinary retention
- Confusion

Case study (continued)

Adrenaline

Infusion of 2-10 mcg min^{-1} titrated to response

OR **Isoprenaline** infusion 5 mcg min^{-1} as starting dose

OR **Dopamine** infusion 2-5 mcg kg^{-1} min^{-1}

Any questions?

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