EKG Interpretation for Nurses

Dawn Sculco, RN, MS, CCRN
Clinical Nurse Specialist

Case study

An 80 yo man was admitted for failure to thrive, has a history of arrhythmias, and is now in atrial fibrillation.

- You would expect the EKG to have the following characteristics:
  - PR interval >0.20 representing rapid atrial firing
  - A quivering baseline with normal QRS complexes
  - QRS >0.12 representing the ventricles initiating the impulse
  - ST elevation

CASE STUDY CONT'D

- His heart rate is 165, blood pressure is 100/71. What do you anticipate as the next treatment?
  - Administration of IV digoxin
  - Administration of PO digoxin
  - Synchronized cardioversion
  - Defibrillation

CASE STUDY CONT'D

- 15 minutes later his blood pressure is 70/30, he is pale and diaphoretic. You should:
  - Prepare for defibrillation
  - Prepare for synchronized cardioversion
  - Prepare for IV digoxin
  - Prepare for intubation

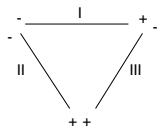
KEY CONCEPTS

- A strong foundation of understanding EKG interpretation principles is essential for nurses that practice in areas with telemetry monitoring.
- Nurses should be able to describe normal cardiac function (blood flow and electrical conduction) and how arrhythmias affect cardiac output.
- Nurses also need to know the primary interventions for basic arrhythmias.

SETTING THE FOUNDATION: WHAT IS THE EKG?

- Print-out of waveforms that are produced by the movement of charged particles across cell membranes within the heart.
- Waveforms are representative of the electrical conduction impulse traveling through the heart to produce cardiac muscle contractions.

Setting the foundation: How the EKG is produced

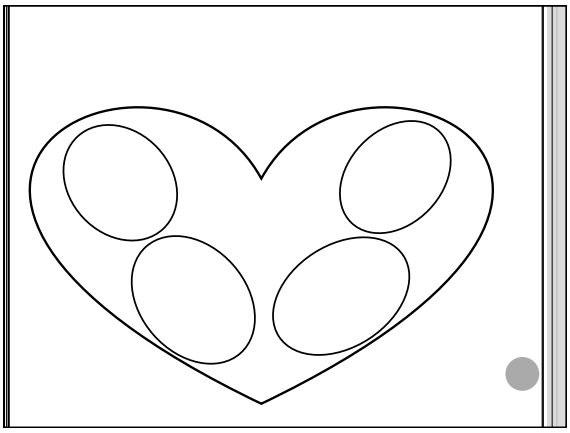


Camera sits at positive electrode, looking at negative electrode

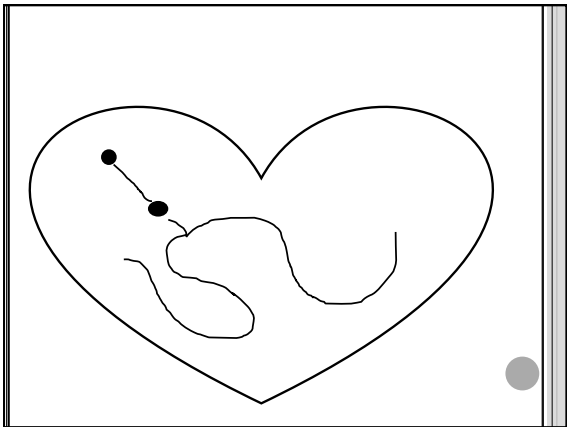
Definitions:

- Conductivity: the ability of a cell to conduct an impulse.
- Automaticity: the ability of a cell to initiate an impulse.
- Contraction: shortening of cells in response to a stimulus. Contraction allows for efficient pumping.
- Depolarization: movement of charged particles across the membrane changing the intracellular environment from negative to positive. In normal cardiac function, depolarization causes mechanical contraction of the cardiac muscle.
- Repolarization: movement of charged particles across the membrane changing the intracellular environment from positive to negative. Repolarization is a "return to resting" state for the cardiac muscle.

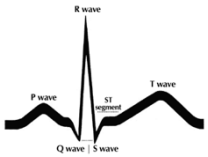
Setting the Foundation: Cardiac Anatomy and Blood flow



Setting the foundation: The electrical conduction system



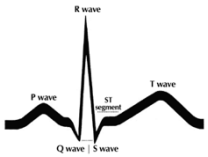
Cardiac cycle



Alternative Pacemakers

Pacemaker	Description	Inherent Rate
SA node	Normal "power house"	60-100
Atrial foci	Cells in the atria that have automaticity	80-100
AV node	Junction between atria and ventricles	40-60
Ventricular foci	Cells in the ventricles that have automaticity	20-40

Segment	How to measure	(Adult)
PR interval	Beginning of P wave to beginning of QRS complex (Q wave- if present, R wave- if no Q wave)	0.12-0.20
QRS complex	Beginning of QRS complex to end of QRS complex (Beginning of QRS complex= Q wave- if present, R wave- if no Q wave)	< 0.12
QTc Interval	Beginning of QRS complex to end of T wave (corrected for heart rate)	Varies – >450 watch for progressive lengthening.



http://www.guthrie.org/services/cardiac/procedures/ekg.gif

Developmental changes with EKG

- Gradual decrease in heart rate
- Gradual lengthening of the PR interval
- Gradual lengthening of the QRS interval

Setting the foundation: Interpretation

- Is just that- an ***interpretation*** as to what is going on within the heart
- Have a system

STEPS TO RHYTHM INTERPRETATION

1. Quick Look
   - P-QRS-T "Do I have what I need for normal cardiac cycle?"
2. Regularity
   - Regular for movement, breathing, etc.
3. Rate
   - Count "QRS"- multiply to get beats per minute
4. PRI
   - Measure an entire strip
5. QRS
   - Measure entire strip
6. QT
   - Measure entire strip

STEPS TO RHYTHM INTERPRETATION

1. Quick Look
2. Regularity
3. Rate
4. PRI
5. QRS
6. QT

http://3.bp.blogspot.com/_RDPYyiESIZE/TMv1Izrh0qI/AAAAAAAA0Q/psamZYSSqb0/s1600/Picture2.jpg

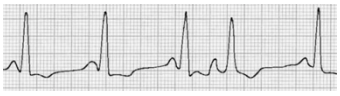
ALTERNATIVE PACEMAKERS

- Atrial foci
- AV node
- Ventricular foci

- Combos- no RULES!

Atrial foci

Atrial Foci



http://www.anaesthetist.com/icu/organs/heart/ecg/images/e_ae.jpg

Av Node

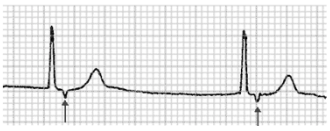
AV Node: Atria contract first

http://www.ambulancetechnicianstudy.co.uk/images/Junc.gif

AV node: Atria and Ventricles contract at same time

http://www.ambulancetechnicianstudy.co.uk/images/Acc_junc.gif

AV Node: Ventricles contract first



General Treatment Guidelines (ACLS)

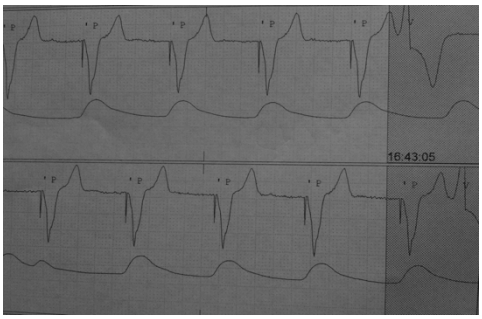
- Stable/Unstable
  - Slow
  - Fast
- Pulseless
  - Defib
  - No defib

Case Study: Pacemaker

- 84 yo man is admitted for MVA- rib fx/pain control. His PMHx is significant for:

1. Aortic valve replacement
2. Pacemaker (he doesn't know why)
3. HTN
4. Venous stasis

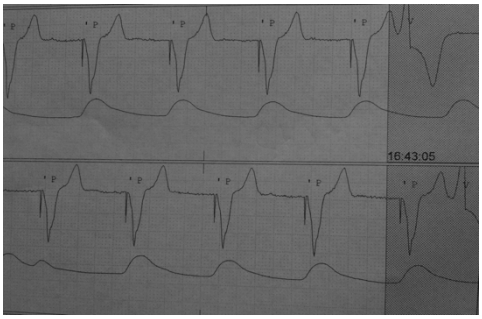
What do you know about his pacer set-up?



Basic pacemaker principles

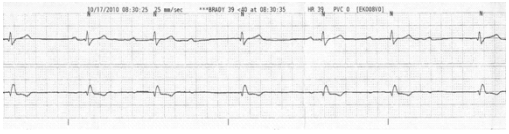
1st letter	2nd letter	3rd letter
Chamber paced	Chamber sensed	Response to signal
A: Atrial V: Ventricular D: Dual Chamber (both atria and ventricle)	A: Atrial V: Ventricular D: Dual Chamber (both atria and ventricle) O: Pacemaker discharge not dependent upon electrical activity	T: Triggering of pacing function I: Inhibition of pacing function

Should I be concerned about the patient?



Case study: Syncopal episodes

- 64 yo male is admitted with syncopal episodes. What rhythm is he in?
- What are treatment/considerations?



Case Study: Failure to Thrive

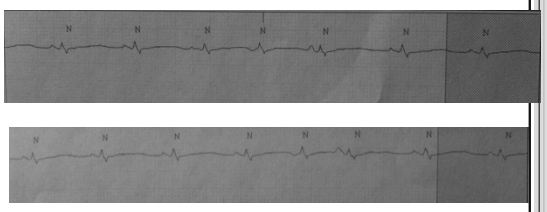
- 80 yo male admitted with FTT presents to the floor with the following EKG. What is your interpretation?

Flattened T waves

- Many causes:
  - Ischemic damage
  - Age
  - Hyperventilation
  - Anxiety
  - LVH
  - Meds
  - Periocarditis
  - PE
  - BBB
  - Electrolyte abnormalities

**Therefore it is referred to as a "non-specific finding"

Case Study: Failure to Thrive

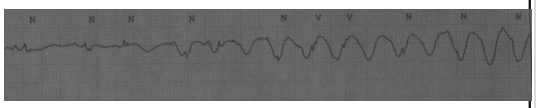


MAT: WHO IS THAT?

- Multifocal Atrial Tachycardia
- Form of WAP (Wandering Atrial Pacemaker), with a rate > 100)

CASE STUDY: FAILURE TO THRIVE

- Below is the patient's EKG the day after admission. Now, what is your assessment?



THANK YOU!!

DawnSculco@Centura.org

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