



Challenging ECGs: Case Studies

This course uses actual challenging patient cases to present an approach to the difficult ECG. The focus will be on problematic electrocardiograms and tips on advanced ECG interpretation.

- Define an approach for interpreting the difficult ECG.
- List several tips that can improve your diagnostic abilities.
- Discuss challenging cases.

MO-25
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Room # N204
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FACULTY

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Interpreting EKG's

1. R/O Artifact

II. The Basic Approach:

- A. Fast or Slow?
- B. Wide or Narrow?
- C. Regular or Irregular?
 - 1. If irregular- irregularly irregular, regularly irregular, or single irregularity?
- D. P's or not?
 - 1. Are they **connected**?
- E. **Axis**?
- F. Ischemia or infarct?
 - 1. ST elevation or depression?
 - 2. Q waves?
 - a. Significant or new?
 - 3. T waves inverted or hyper acute?
 - 4. BBB?
 - a. concordant= ST segment and last part of QRS in same direction (ie. Both up or both down)
 - b. discordant= ST segment and last part of QRS in opposite direction (one up, other down or vice versa)
- G. Hypertrophy or low voltage?
 - 1. Atrial?
 - 2. Ventricular? (≥ 5 points = definite, 4= probable)
 - a. Voltage = 3 points
 - b. Strain pattern = 3 points w/o dig and 1 point w/ dig
 - c. LAA = 3 points
 - d. LAD = 2 points
 - e. Intrinsicoid deflection (beginning of QRS to zenith of R $> .04$ sec) = 1 point
- H. Special cases?
 - 1. S1 Q3 T3
 - 2. Pericarditis
 - 3. Hyperkalemia
 - 4. Prolonged QT
 - a. TCA OD
 - 5. Increased ICP/ "Hypometabolicemia"
 - 6. WPW
 - 7. SVT
 - a. Atrial flutter
 - b. Atrial fibrillation
 - c. MAT
 - d. Ashman's phenomenon
 - 8. Wide Complex Tachycardia

111. The EKG Itself

- A. How long is a tracing?
- B. What is a normal standard?
- C. Don't ignore a "funny-looking" lead; look above and below

10 Commandments of EKG's

Lead I is your friend.

An old tracing (but not too old) is also a friend; that's what fax machines are for.

Two heads are often better than one.

If the patient is stable, you've got time to think about the EKG; if they're not stable revert to ACLS.

The computer is not as smart as you, but it's pretty good at axis and intervals.

If it's fast and the patient is unstable, shock it.

Ignore AVR, except in suspected pericarditis or TCA OD.

LBBB is never benign and often means CAD; make LBBB your friend.

Don't be afraid to repeat tracings frequently in suspected ischemia (including right-sided leads)

Remember the following rates and their significance: 300, 160, 150, 140, 100, 60, 50

ANSWER KEY

- I. Artifact
- 1a. Torsades
- 2 Artifact
- 3 Artifact, sinus rhythm
- 3a,b Artifact, speed set at 50 mm/sec
- 4 Reversed limb leads, coupled PVC's, fusion beat
- 5 a & b Dextrocardia - standard leads, all leads reversed
- 6 RBBB
- 7 LBBB
- 7a LAHB, PVC's, fusion beats
- 7b LPHB
- 7c Osborn waves (hypothermia)
- 8 RBBB, anterior MI
- 9 Inferior MI, 2: 1 Block (Mobitz 2 second degree)
- 9b Inferior MI, A:V Dissociation (third degree heart block)
- 10 Inferior MI, RV infarct, AV Dissociation
- 12 RBBB, LAD (Bifascicular block), anterior MI
- 13 RBBB, inferior MI
- 13a LBBB, anterolateral MI
- 13b LBBB, inferoposterior infarct (RV)
- 13c,d,e LBBB, 1st tracing-anterior MI, 2nd tracing-old, 3rd-after lytic
- 13f,g LBBB, 1st tracing - inferior MI, 2nd tracing - old
- 13h Permanent transvenous pacemaker, anterior MI
- 14 Inferolateral MI, hyperacute T waves
- 15 Anterior MI, aberrant atrial focus
- 16. 17 1st tracing- with CP - "normal," 2nd tracing - 15 minutes later - Lateral wall infarct

- 18,19,20 1st tracing with CP - "normal", 2nd tracing Right sided leads showing RV infarct, 3rd tracing 15 min later evolution of changes of inferior MI.
- 21a "Wellen's Warning"
- 21 Sinus tachycardia, PR depression, scattered ST elevation - pericarditis
- 22 Sinus tachycardia, diffuse ST elevation, PR depression - pericarditis
- 22b, c Sinus tachycardia electrical alternans - pericarditis
- 22d Early repolarization
- 22e Early repolarization
- 22f Early repolarization
- 22g Early repolarization
- 23 Axis directly posterior, Old anterolateral MI, Aneurysm
- 24 Rightward terminal forces, prolonged QTc, TCA OD
- 25a Prolonged QTc, frequent PVC's (bigeminy), R on T
- 25b Prolonged QU, hypokalemia
- 27a Congenital prolonged QTc (T wave alternans)
- 27b Congenital prolonged QTc, Torsades following R on T
- 26 Short PR, LGL
- 28 AV dissociation (junctional escape), hypokalemia, - magnesemia, -calcemia
- 29 Prolonged QU, Hypokalemia (2.8)
- 30 Roller coaster T waves - Increased ICP
- 32 Roller coaster T waves - Hypokalemia, - magnesemia - calcemia
- 33 RAD, Potassium normal
- 34, 35 Initial tracing Hyperkalemia, 2nd tracing, after treatment
- 35 a, b, c Serial tracings of hyperkalemia being treated
- 36 Junctional rhythm, hyperkalemia
- 37 Hyperkalemia
- 39 Progression of hyperkalemia on the monitor

- 41 RAA, LAA, RVH
- 48 Junctional rhythm, strain pattern; Dig toxicity
- 49 Demand pacemaker, failure to sense
- 50 Mobitz 1 second degree heart block, 5:4, Wenkebach
- 51 Diffuse low voltage, bradycardia, Myxedema
- 52 Low voltage lateral limb leads, Left pneumothorax
- 53 S₁, Q₃, T₃; anterior T wave inversions, pulmonary embolus
- 56 SVT, electrical alternans, probable bypass tract with concealed conduction, "Wellen's Sign"
- 57 Atrial flutter, 2:1
- 59 Atrial flutter, 2:1
- 61 Atrial flutter with variable block (2:1, 3:1), Ashman's phenomenon
- 62 Atrial fibrillation with Ashman's phenomenon
- 64 MAT, LAD, strain pattern
- 65 MAT, probable RVH
- 67 Wide complex tachycardia, VT
- 68 Wide complex tachycardia, SVT (WPW)
- 71 Wide complex tachycardia, atrial fibrillation
- 72 WPW, pseudoinfarct
- 73 WPW, pseudoinfarct
- 74 WPW
- 76 LVH
- 77 LVH