

12LeadEKG.net Worksheet (Marriott's Criteria)

1. Rate (< 60 = Brady, > 100 = Tachy)
2. Rhythm (Regular / irreg-Reg Irreg. / irreg irreg)
3. Axis (< -30 = LAD, > 110 = RAD)
4. P Waves and Intervals: PR (120-200 mS)
5. QRS (50-100 mS)
6. QTc (390-440 mS)
7. Hypertrophy: (RA, LA, RV, LV)
8. Blocks (SA blocks, AVHB, RBBB, LBBB, LAFB, LPFB)
9. Ischemia (T inversions, ST depression)
10. Injury (ST elevation)(reciprocal changes)
11. Infarct (significant Q or Q equivalents)
12. Other (WPW/LGL, high or low Mg/K/Ca, hypothermia, Wellen's, Brugada's, S1Q3T3)

For ADULT patients only. EKG Frequency should be set to 0.05-100 or 150 Hz. Ideally filters should be off if possible.

CHAMBER ENLARGEMENT

Left Atrial Enlargement

- 1) P-terminal force in V1 (depth x duration of terminal neg deflection) > 0.04 mm-sec
- 2) Notched P > 0.12 secs (II)
- 3) P-wave LAD (+15 to -90)

Right Atrial Enlargement

- 1) Tall (>2.5mm) peaked P in lead II, III, F, nl duration
- 2) P axis > 75
- 3) V1 or V2 P > 1.5 mm high

Biatrial Enlargement

- 1) Large diphasic P in V1 > 1.5 up and 1 down
- 2) Tall peaked P V1-3, & wide notched P in limb leads or V5-6
- 3) Increase in amplitude (>2.5) and duration (>0.12) in limb leads.

Left Ventricular Hypertrophy

Quick: S in V1 + R in V6 > 35mm

Romhilt & Estes (5 pts or greater = LVH)

- 1) Amplitude 5
 - Any of the following:
 - a. largest R or S in limbs > 20
 - b. S in V1 or V2 > 30
 - c. R in V5 or V6 > 30
- 2) Strain pattern (V5-6 ST depressions)
 - without digitalis 3
 - with digitalis 1
- 3) Left atrial involvement (terminal neg in V1 P-wave > 1mm down, 0.04 wide) 3
- 4) LAD (<-30) 2
- 5) QRS > 0.09 1
- 6) Intrinsicoid deflection V5-6 > 0.05sec 1

Right Ventricular Hypertrophy

- 1) RAD > +110
- 2) R > S in V1
- 3) R in V1 > 7mm
- 4) S in V1 < 2mm
- 5) QR in V1
- 6) RSR' in V1, R' > 10 mm
- 7) ST depts/T inversions V1-3

Combined Ventricular Hypertrophy

- 1) ECG meets either LVH or RVH criteria
- 2) LVH in precordials, but QRS > +90
- 3) R > Q in aVR, S > R in V5, T-inversion V1

PULMONARY EMBOLISM

- 1) S1Q3T3 pattern
- 2) RAD
- 3) RBBB, transient
- 4) T-wave inversions, V1-V3
- 5) Sinus tachycardia
- 6) Inverted Ts in inferior leads

BLOCKS

Left Bundle Branch Block

- 1) QRS > 0.12 sec
- 2) Broad, monophasic R in I, V5, V6, usually notched or slurred
- 3) No Q in I, V5, V6
- 4) Delayed Onset of Intrinsicoid Deflection (R peak time) in V5 and V6
- 5) ST depressions laterally

Right Bundle Branch Block

- 1) QRS >= 0.11 secs
- 2) rSR', rsR' in V1
- 3) Delayed OID > 0.05 secs
- 4) Wide S in I, V5-6

Left Anterior Fascicular Block

- 1) LAD (> -30)
- 2) qR in I, aVL, rS in II, III, aVF
- 3) QRS <= 110 or 20 mS > baseline

Left Posterior Fascicular Block

- 1) RAD > +90
- 2) Deep S in I
- 3) Q in III
- 4) QRS (<120)

Bifascicular Block (RBBB + LAFB)

- 1) QRS > 0.11 secs
- 2) RSR in V1, with broad, slurred R
- 3) Wide, slurred S in I, V5-6
- 4) First half of QRS has LAD
- 5) Initial r in inferior leads

LOCATION CRITERIA

Anteroseptal: V1-V2

Anterior: V3-V4

Anterolateral: V5-V6, I, aVL

Lateral: I, aVL, V6

Inferior: II, III, aVF

Inferolateral: II, III, aVF, V5, V6

Posterior: R > S in V1, V2 & R > 0.04 sec

Ischemia- inverted Ts, 0.5 mm ST depression

Injury - ST elevation 1mm, 2-3mm in V1-2

Infarct - significant Q, poor R wave progression in V leads (only 30% specific)

Right Ventricular:

- 1) Signs of acute inferior or inf/post infarct.
- 2) ST elevation in V1 with depression in V2
- 3) ST elevation in V3RV4R of 1 mm or more

Mycardial Infarction In LBBB

- 1) Q waves in I, V5 or V6
- 2) R-wave progression reversed V1-4
- 3) Primary ST/T wave changes
- 4) See Sgarbossa's Criteria on separate page

DIFFERENTIALS, ETC

RAD

Normal young adults,
COPD without cor pulmonale
Lateral MI, LPFB

R > S in V1

Normal young adults (1% of cases)
Posterior infarct "Q equivalent"
Displacement of heart / CCW Rotation
RBBB, RVH, WPW

R<S in V5-6

LAFB (or LPFB)
COPD
Anterior MI scar

RSR' in V1

Incomplete RBBB or RBBB
Normal variant
Posterior MI, Epsilon waves
Pectus abnormalities

Long QT = Risk of TDP/VT/Vf

LQTS genetic
Jervell-Lange-Nielson syndrome
Romano-Ward syndrome
LQTS Acquired
Hypomagnesemia quinidine/procaine/
sotalol/amiodarone tricyclics/
phenothiazines/pentamidine
Imidazoles, CNS hemorrhage / MI

MI Vessels

LAD: anterior, anteroseptal

RCA: inferior, 50% inf/post & post, inf/RV (prox RCA)

LCX: antero/post/inferolateral, high lateral, 50% of inf/post & post

Evolution of Changes in Q-Wave MI

- 1 - Tall, broad T waves (hyperacute)
- 2 - ST elevation
- 3 - Q waves develop
- 4 - decreased ST elev., T waves invert

Limb Lead Reversal vs. Dextrocardia

Both: Lead I = neg QRS and inv T-waves
Dextro: Precordium has reverse progression of R-waves
LLR: Precordium is normal

Hyperkalemia

- 1) Peaked T-waves
- 2) Flat or absent P-waves
- 3) PR prolongation

Brady/tachyarrhythmias/sine wave

Hypokalemia: U increased amplitude

Hypercalcemia: Short QT

Hypocalcemia: Long QT

Hypothermia: Osborne Wave (J-wave), a "hump" between QRS and T-wave

Pearls

- 1 - Persistent ST elevation in pt with prior MI = ventricular aneurysm
- 2 - widespread PR dep, ST elevations /T-wave inversions = pericarditis
- 3 - Negative P, QRS and T in I is probably limb-lead reversal (see above)
- 4 - Short PR, delta-wave = WPW
- 5 - Short PR normal QRS = LGL