ECG MIMICS OF MYOCARDIAL ISCHEMIA AND INFARCTION

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PITFALLS IN THE ACCURACY OF THE ECG DIAGNOSIS OF ACUTE MI

- Nonspecific ST/T wave abnormalities
- Age of Q-waves (may not be known)
- Paced ventricular rhythm
- Left bundle branch block
- Right bundle branch block: secondary ST-T abnormalities in V1-3 can mimic anterior wall MI; tall R waves in V1-2 can mimic posterior wall MI
- Nonspecific intraventricular conduction delay with repolarization abnormalities

DIAGNOSIS OF ACUTE MI IN LBBB

- 1 mm ST segment change in same direction as terminal QRS
- More than 5 mm ST elevation in direction opposite to QRS
- Sgarbossa criteria (NEJM 1996;334:481)
  - ST-elevation > 1 mm in lead with concordant QRS complex 5 points
  - ST-depression > 1 mm in leads V1, V2 or V3 3 points
  - ST-elevation > 5 mm in lead with discordant QRS complex 2 points

Same patient, baseline ECG obtained 6 months earlier
PITFALLS IN THE ECG DIAGNOSIS OF ACUTE MI: MI MIMICS - 1

- Early repolarization
- Electrolyte disorders
  - Hyperkalemia
  - Hypokalemia
- Inflammatory conditions
  - Pericarditis
    - (PR depression, scooped ST segments, J point elevation)
  - Myocarditis
- Conduction system disorders
  - Fascicle blocks
    - Anterior: qV2-3, aVL, Poor R progression
    - Posterior: q II, III, aVF

PITFALLS IN THE ECG DIAGNOSIS OF ACUTE MI: MI MIMICS - 2

- Accessory pathways: - ventricular pre-excitation
- Cardiac conditions
  - LVH, RVH
  - HCM
- Arrhythmias
  - Wide QRS tachycardias
  - Ectopic atrial tachycardias with prominent T waves
  - Paced ventricular rhythm with inapparent pacing artifacts
  - Junctional or ventricular tachycardias with retrograde conduction
  - Atrial flutter with flutter waves $\rightarrow$ pseudo ST $\uparrow$ or $\downarrow$
  - Brugada pattern

PITFALLS IN THE ECG DIAGNOSIS OF ACUTE MI: MI MIMICS - 3

- Other
  - Osborne waves
  - Pneumothorax with mediastinal shift
  - Double standardization

EARLY REPOLARIZATION

- Prevalence about 1%
- Male prevalence (87% in men, 33% in women)
- Age less than 50 (OR 3.3)
- High prevalence in black and Asian races
- High prevalence in athletes
- Benign clinical course
- Exercise and hyperventilation normalize the pattern
EARLY REPOLARIZATION: ECG FEATURES

- J point elevation
- Terminal R wave notch
- Upwardly concave ST segments
- PR segment depression often seen
- PR interval often short
- Bradycardia common
- Best seen in precordial leads (usually V2-4); unusual in limb leads
- Early transition common
- T waves tall and asymmetric
- U waves often present (may be negative)

EARLY REPOLARIZATION

HYPERKALEMIA vs ANTERIOR OR INFEROPOSTERIOR WALL MI vs BRUGADA PATTERN

BRUGADA PATTERN

Type 1

- Type 1 (Coved ST segment elevation ≥2mm in ≥1 of V1-V3 followed by a negative T wave) is the only ECG abnormality that is potentially diagnostic. This has been referred to as Brugada sign.
- This ECG abnormality must be associated with one of the following clinical criteria to make the diagnosis:
  - Documented ventricular fibrillation (VF) or polymorphic ventricular tachycardia (VT).
  - Family history of sudden cardiac death at <45 years old.
  - Coved-type ECGs in family members.
  - Inducibility of VT with programmed electrical stimulation.
  - Syncope.
  - Nocturnal agonal respiration.

MICS OF MYOCARDIAL ISCHEMIA AND INFARCTION REVISED FOR LAS VEGAS 2008
BRUGADA PATTERN Type 2

- Type 2 has >2mm of saddleback shaped ST elevation.

BRUGADA PATTERN Type 3

- Brugada type 3 can be the morphology of either type 1 or type 2, but with <2mm of ST segment elevation.

BRUGADA SYNDROME

- There’s really only one type of Brugada syndrome.
- Diagnosis depends on a characteristic ECG finding AND clinical criteria.
- Further risk stratification is controversial.
- Definitive treatment = ICD.
- Brugada sign in isolation is of questionable significance.

BRUGADA SYNDROME

- Brugada syndrome can also be unmasked or augmented by multiple factors:
  - Fever
  - Ischaemia
  - Multiple Drugs
    - Sodium channel blockers eg: Flecainide, Propafenone
    - Calcium channel blockers
    - Alpha agonists
    - Beta Blockers
    - Nitrates
    - Cholinergic stimulation
    - Cocaine
    - Alcohol
  - Hypokalaemia
  - Hypothermia
  - Post DC cardioversion
37 y.o. o+-“found down”

6 hrs. later: T° 25° → 30° C

J (OSBORNE) WAVE
Results from electrical heterogeneity between ventricular endo- and epicardium during repolarization

Seen in:
- Hypothermia
- Hypercalcemia
- Intracranial (subarachnoid) bleed
- Brugada syndrome
- Coronary vasospasm
- Idiopathic VF
- ? Ischemia