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Cardiologists and the ECG: Are We Really That Good at It? Part II

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Disclosure Information

• I will not discuss off label use or investigational use in my presentation

• I have no financial relationships to disclose
Objectives

• Identify and describe different mechanisms of conduction disturbances and arrhythmias
• Develop skills and confidence in the interpretation of abnormalities on the ECG
• Demonstrate utilisation of the ECG for clinical decision making
A Patient With Palpitations...
Can you describe the ECG?

A. Ventricular tachycardia
B. Atrial fibrillation
C. Torsade de pointes
D. Ventricular fibrillation
Can you describe the ECG?

A. Ventricular tachycardia
B. Atrial fibrillation
C. Torsade de pointes
D. Ventricular fibrillation
Atrial Fibrillation With Aberrant Conduction
ECG in a Patient with HF...
Can you describe the ECG?

A. RBBB
B. LBBB
C. Bidirection tachycardia
D. «Masquerading» BBB
Can you describe the ECG?

A. RBBB
B. LBBB
C. Bidirection tachycardia
D. «Masquerading» BBB
«Masquerading» Bundle Branch Block

Choudhary D. Indian Heart J 2014;66:139-40
LEFT BUNDLE BRANCH BLOCK MASQUERADING AS RIGHT BUNDLE BRANCH BLOCK

Justin L. Richman, M.D., and Louis Wolff, M.D.

Boston, Mass.
Masquerading bundle branch block: a variety of right bundle branch block with left anterior fascicular block
Masquerading Bundle Branch Block

The proper recognition of ‘masquerading bundle branch block’ may allow in making the proper clinical decision:

1. It gives us information about the poor prognosis because of coexisting extensive heart damage and conduction disturbances associated with LVH, scar and/or fibrosis
2. It increases the risk of complete heart block
3. In the era of resynchronisation therapy (CRT), mistaken LBBB could lead to improper CRT implantation

ECG in a Patient with Intracranial Hemorrhage...
Hour 0
Hour 12
Hour 22
What is the significance of these ECG findings?

A. RVAD
B. Brugada Syndrome. Type 1
C. Brugada Syndrome. Tipe 2
D. Brugada phenocopy
What is the significance of these ECG findings?

A. RVAD
B. Brugada Syndrome. Type 1
C. Brugada Syndrome. Tipe 2
D. Brugada phenocopy
Brugada Phenocopy

Labadet C. Int Cardiol 2014;177:e156–e157
1. The ECG pattern has a type 1 or type 2 Brugada morphology
2. The patient has an underlying condition that is identifiable
3. The ECG pattern resolves after resolution of the underlying condition
4. There is a low clinical pretest probability of true Brugada syndrome, determined by lack of symptoms, medical history, and family history

*Anselm D. Rev Esp Cardiol 2013;66:755–9*
Brugada Phenocopy

5. Negative provocative testing with sodium channel blockers such as ajmaline, flecainide, or procainamide

6. Provocative testing not mandatory if surgical RV outflow tract manipulation has occurred within the last 96 hours

7. The results of genetic testing are negative (desirable but not mandatory because the SCN5A mutation is identified in only 20-30% of true Brugada syndrome).

A Patient with Wide QRS...?
What is the significance of these ECG findings?

A. LBBB + QRS fragmentation
B. LBBB + QRS no fragmentation
C. LBBB + LAFB
D. LBBB + LPFB
What is the significance of these ECG findings?

A. LBBB + QRS fragmentation
B. LBBB + QRS no fragmentation
C. LBBB + LAFB
D. LBBB + LPFB
Fragmented LBBB
QRS Fragmentation

Pietrasik G. Cardiology Journal 2012;19:114–21
Fragmented Wide QRS on a 12-Lead ECG
A Sign of Myocardial Scar and Poor Prognosis

Mithilesh K. Das, MD; Hussam Suradi, MD; Waddah Maskoun, MD; Mark A. Michael, MD; Changyu Shen, PHD; Jonathan Peng, MD; Gopi Dandamudi, MD; Jo Mahenthiran, MD
Fragmented LBBB

• A moderately sensitive and highly specific sign for myocardial scar in patients with known or suspected coronary artery disease

• An independent predictor of mortality

Das M. Circ Arrhythmia Electrophysiol 2008;1:258-68
Fragmented LBBB
QRS Fragmentation

\[ p < 0.0001 \]
A Patient with Fever and Chest Pain…
What is the significance of these ECG findings?

A. Acute myocardial infarction
B. Pericarditis
C. Benign early repolarization
D. Brugada syndrome
What is the significance of these ECG findings?

A. Acute myocardial infarction
B. Pericarditis
C. Benign early repolarization
D. Brugada syndrome
Pericarditis
Common Causes of ST Segment Elevation

- Acute myocardial infarction
- Coronary vasospasm (Printzmetal’s angina)
- Pericarditis
- Benign early repolarization
- Left bundle branch block
- Left ventricular hypertrophy
- Ventricular aneurysm
- Brugada syndrome
- Ventricular paced rhythm
- Raised intracranial pressure
4 Keys for the Diagnosis of Acute Pericarditis!!!
1. PR Segment Depression in V5 Due To Acute Pericarditis
2. PR Segment Elevation in aVR Due To Acute Pericarditis
3. Spodick’s Sign: Downward Sloping TP Segment
4. ST/T Wave Ratio

ST/T wave ratio < 0.25
- Benign Early Repolarization

ST/T wave ratio > 0.25
- Pericarditis
A Patient with Unstable Angina...
What Features Would You Spect in the CCG?

A. Proximal LAD
B. LAD + Cx
C. LAD + RC
D. Main coronary
What Features Would You Spect in the CCG?

A. Proximal LAD
B. LAD + Cx
C. LAD + RC
D. Main coronary
Wellen’s Syndrome
Smith S. The ECG in acute MI. 1st Philadelphia. Lippincott, Williams & Wilkins. 2002
Characteristic electrocardiographic pattern indicating a critical stenosis high in left anterior descending coronary artery in patients admitted because of impending myocardial infarction

In patients admitted to the hospital because of unstable angina, a subgroup can be recognized that is at high risk for the development of an extensive anterior wall myocardial infarction. These patients, who show characteristic ST-T segment changes in the precordial leads on or shortly after admission, have a critical stenosis high in the left anterior descending coronary artery. Of 145 patients consecutively admitted because of unstable angina, 26 (18%) showing this ECG pattern, suggesting that this finding is not rare. In spite of symptom control by nitroglycerin and beta blockade, 12 of 16 patients (75%) who were not operated on developed a usually extensive anterior wall infarction within a few weeks after admission. In view of these observations, urgent coronary angiography and, when possible, coronary revascularization should be done in patients with unstable angina who show this ECG pattern. (Am Heart J 103:730, 1982.)
Wellen’s Syndrome

1. Characteristic T-wave changes
2. History of anginal chest pain
3. Normal or minimally elevated cardiac enzyme levels
4. ECG without Q waves, without significant ST-segment elevation, and with normal precordial R-wave progression

A Patient with Nocturnal Angina and Syncope...
What is the Interpretation of These ECG Findings?

A. STEMI
B. Non-STEMI
C. Prinzmetal’s angina
D. Congenital anomalous of the left coronary artery from the right aortic sinus of Valsalva
What is the Interpretation of These ECG Findings?

A. STEMI
B. Non-STEMI
C. Prinzmetal’s angina
D. Congenital anomalous of the left coronary artery from the right aortic sinus of Valsalva
Complete Atrioventricular Block With Inferoposterolateral ST Segment Elevation

Bastante-Valiente T. Rev Esp Cardiol. 2008;61:327-33
Is There any Conduction Abnormality?

A. LBBB
B. RBBB
C. Complete AV block
D. Second degree AV block
Is There any Conduction Abnormality?

A. LBBB
B. RBBB
C. Complete AV block
D. Second degree AV block
Angina Pectoris*

I. A Variant Form of Angina Pectoris

Preliminary Report

Myron Prinzmetal, M.D., Rexford Kennamer, M.D., Reuben Merliss, M.D., Takashi Wada, M.D. and Naci Bor, M.D.

Los Angeles, California
Prinzmetal’s Angina

1. It frequently occur in patients without coronary artery lesions or in association with mild coronary stenosis
2. Crises of coronary spasm may be silent in around 20–30% of cases, and ventricular arrhythmia may appear during these crises, this may explain the existence of unexpected sudden death due to ischemia
3. In the early phase, ischemia is very often limited to the subendocardial area (tall T waves)

*de Luna A. Ann Noninvasive Electrocardiol 2014;19:442-53*
Prinzmetal’s Angina

4. Later on, ischemia becomes transmural (ST elevation) and lasts for a few minutes. In the resolution phase, deep negative T waves can be seen and they are transient and related to reperfusion.

5. Occasionally, only pseudo-normalization of previous negative T waves occurs, sometimes with the appearance of negative U waves.

de Luna A. Ann Noninvasive Electrocardiol 2014;19:442-53
Prinzmetal’s Angina

6. Ventricular arrhythmias are frequent and they are often related to the severity and duration of ischemia and usually not to the presence of preexisting coronary stenosis. Ventricular arrhythmias appear during the crisis, especially at the moment of maximal ischemia (highest ST-segment elevation) or during the resolution period. In at least one-third of cases, NSVT occurred. Occasionally, SVT often polymorphic has been described.

7. Other types of arrhythmias may also occur, especially AV block in case of spasm of RCA

de Luna A. Ann Noninvasive Electrocardiol 2014;19:442-53
A Patient with Acute Chest Pain...
How to Treat This Patient?

A. Reperfusion
B. Nitrates
C. β blockers
D. Calcium channel blocker
How to Treat This Patient?

A. Reperfusion
B. Nitrates
C. β blockers
D. Calcium channel blocker
http://lifeinthefastlane.com/ecg-library/de-winters-t-waves/
A New ECG Sign of Proximal LAD Occlusion

De Winter’s T Waves

- The de Winter ECG pattern is an anterior STEMI equivalent that presents without obvious ST elevation
- Key diagnostic features include ST depression and peaked T waves in the precordial leads
- The de Winter pattern is seen in ≈2% of acute LAD occlusions and is under-recognised by clinicians
- Unfamiliarity with this high-risk ECG pattern may lead to under-treatment (e.g. failure of cath lab activation)

http://lifeinthefastlane.com/ecg-library/de-winters-t-waves/
A Patient With a “Very Particular” P Wave...
What Does it Happen With the P Wave?

A. Normal P wave
B. Partial interatrial block
C. Advanced (complete) interatrial block
D. Atrial flutter
What Does it Happen With the P Wave?

A. Normal P wave
B. Partial interatrial block
C. Advanced (complete) interatrial block
D. Atrial flutter
Advanced Interatrial Block

Enriquez A. Europace. 2015;17:1289-93
Diabetes
Obstructive Sleep Apnea
Metabolic Syndrome
Hypertension
P Wave Duration Prolongation (IAB)
Age >65 yrs
Atrial Arrhythmias
Thromboembolism
Cardiac Morbidity and Mortality
A “Cold” Patient...
What is this Wave Name?

A. Osborn
B. Epsilon
C. Delta
D. Messi
What is this Wave Name?

A. Osborn
B. Epsilon
C. Delta
D. Messi
J (Osborn) Wave

- Hypothermia
- Normal variant
- Hypercalcaemia
- Medications
- Neurological insults
- Syndrome d’Haïssaguerre (idiopathic VF)

http://lifeinthefastlane.com/ecg-library/basics/osborn-wave-j-wave/
The Early Repolarization Pattern

A Consensus Paper

Peter W. Macfarlane, DSc,* Charles Antzelevitch, PhD,† Michel Haissaguerre, MD,‡ Heikki V. Huikuri, MD, PhD,§ Mark Potse, PhD,¶ Raphael Rosso, MD,‖ Frederic Sacher, MD,¶ Jani T. Tikkanen, MD, PhD,§ Hein Wellens, MD,# Gan-Xin Yan, MD, PhD**
Epsilon Wave

• Arrhythmogenic RV dysplasia

Pérez Diez D. E-Journal of the ESC Council for Cardiology Practice 2008;7
Delta Wave

- WPW Syndrome

http://lifeinthefastlane.com/ecg_library/basics/delta-waves/
Thank you