The Wide QRS Complex

Jeffrey Tabas, MD
Professor of Emergency Medicine
UCSF School of Medicine

Goals: Widen Your Understanding!

1. Describe the ECG findings of left bundle branch block
2. Describe the diagnosis of acute MI when LBBB pattern is present

Case 1
65 y.o F with fatigue and known LBBB

- 65 y.o. F BIBA from work w/ fatigue x 2 days, started vomiting today. No CP.
- Has known LBBB
- Vital signs and physical exam are unremarkable

1) 65 y.o. F with fatigue and known LBBB

1 hour into ED course, pt develops VF arrest

Case 1
65 y.o F with fatigue and known LBBB

- Unable to pull up old ECG due to computer crash. Old chart ordered from medical records.
- 1 hour into ED course, pt develops VF arrest

6 CAUSES - WIDE QRS

- Bundle branch block
- Ventricular rhythm
- Hyperkalemia
- Medications
- Paced rhythm
- WPW
Case 1 - Questions

• How do we diagnose LBBB?

• Can we read ST deviation?

**BUNDLE BRANCH BLOCKS**

- The QRS is wide, usually > 0.14
- Look at **TERMINAL** portions of the QRS in Lead V1 and Lead 1 (V6)
  - RBBB = Terminal R in V1 and Slurred S in 1 (V6)
  - LBBB = Terminal R in 1 (V6) and Slurred S in V1
- The ST segments are opposite to the terminal portion of the QRS
Left Bundle Branch Man

LBBB: Normal ST Segments
- Iso-electric or
- Discordant (ST segment opposite the terminal QRS)
- This is true for every lead

ACUTE MI in LBBB
- Concordant ST segments (same direction as QRS) - 1 mm in any lead
OR
- Excessively Discordant ST segments (opposite QRS but inappropriately large: ST height to S wave height = 1/4 or more)

Ischemic Findings in LBBB
Annals of EM, October 2008
Electrocardiographic Criteria for Detecting Acute Myocardial Infarction in Patients With Left Bundle Branch Block: A Meta-analysis

Ischemic Findings in LBBB
- 1 mm Concordant ST elevation
  - 10 studies with 1,614 patients
  - Sensitivity = 20% (NLR = 0.8)
  - Specificity of 98% (PLR = 7.9)
- 5 mm Discordant ST elevation
  - Specificity of 80% (PLR = 4.5)
**Ischemic Findings in LBBB**

*Annals of EM, August 2012*

Diagnosis of ST-Elevation Myocardial Infarction in the Presence of Left Bundle Branch Block With the ST-Elevation to S-Wave Ratio in a Modified Sgarbossa Rule

Stephen W. Smith, MD, Kenneth W. Dodd, MD, Timothy C. Heeney, MD, David M. Dereka, MD, Leslie A. Pavlica, MS

---

**Ischemic Findings in LBBB**

- **Excessive Discordance**
  - ST:S wave = 1:4 or more
  - Sensitivity 58% (vs 30%)

---

**ACUTE MI in LBBB**

<table>
<thead>
<tr>
<th>CONCORDANT ST Elevation</th>
<th>CONCORDANT ST Depression</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Electrocardiogram" /></td>
<td><img src="image2.png" alt="Electrocardiogram" /></td>
</tr>
</tbody>
</table>

---

**ACUTE MI in LBBB**

<table>
<thead>
<tr>
<th>EXCESSIVE DISCONCORDANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST:S wave = 0.25 or more</td>
</tr>
</tbody>
</table>

---

1) 65 y.o F with known LBBB - baseline

---

Another pt with LBBB and Chest Pain

---
Yet another pt with LBBB and Chest Pain

86 F with CP/SOB and pacer

2) 86 F with CP/SOB and pacer

2) Prior ECG

How About LBBB “Not Known to be Old?”

Current Indications for PCI and Thrombolytics

• 1mm ST elevation in 2 contiguous leads or
• Left Bundle Branch not known to be old

New or Presumed New LBBB

Chang, Am JEM, 2009

• 55 with New LBBB = 7.3% AMI
• 136 with Old LBBB = 5.2% AMI
• 7746 with no LBBB = 6.1% AMI

New LBBB is not predictive of AMI
For LBBB
• Use Sgarbossa criteria
• If absent, use rapid serial cardiac biomarkers, bedside echo, or both

Take Home Points
Dx of AMI in LBBB/Pacing

Acute MI
• Concordant ST segments (in same direction as QRS)
  – 1 mm in any lead
• Excessively Discordant ST segments (opposite direction as QRS)
  – ST:S wave = 1:4 or more
  – ST >=5 mm (not as accurate)

Take Home Points
Dx of AMI in LBBB not known to be old

AHA/ACC Approach
• Presumed New LBBB is an indication for reperfusion
• However, this is not predictive of AMI

My Approach
• Activate cath lab if moderate suspicion (>25%)
• Initiate thrombolitics for high suspicion (> 50%)
• Use cardiac markers or formal echo for the rest.
  Involve consultant as early as possible

Pearls