Complete Right Bundle Branch Block
associated to
Right Ventricular Hypertrophy
VCG classification of isolated Complete Right Bundle Branch Block in the HP

Grishman or Kennedy type I

Cabrera or Kennedy type II

Kennedy type III or C

RECD: Right End Conduction Delay

Type II in atrial septal defects, pulmonary stenosis, in COPD and in chronic Chagasic myocarditis.

Initial vector to the front, QRS loop of CW rotation and main body located in anterior quadrants. Severe RVH.
The diagnosis of RVH in the presence of CRBBB by ECG criteria

**ECG in the Frontal Plane**

<table>
<thead>
<tr>
<th>Isolated CRBBB</th>
<th>CRBBB associated to RVH</th>
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<tbody>
<tr>
<td>I and aVL</td>
<td>qRS</td>
</tr>
<tr>
<td>II- III- aVF</td>
<td>Variable.</td>
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</tbody>
</table>

**ECG in the precordial leads**

- Voltage of R’ wave of V₁ (rsR’) of 15 mm of height or greater in the presence of CRBBB;
- Voltage of R’ wave of V₁ (rSR’) of 10 mm of height or greater in the presence of IRBBB;
- R’ wave of great voltage is more likely to correspond to RVH in children than in adults;
- Persistence of triphasic morphology (rSR’) in intermediary precordial leads (V₃ and V₄). This sign suggests hypertrophy of RV free wall;
- qR pattern in V₁ may be an indirect sign of RAE and this of RVH;
- 6) Tetraphasic pattern (rsr’s’) in V₂, V₃ and up to V₄ suggests hypertrophy of trabecular region of the RV;
- Complex of the R/S type with negative T waves, beyond V₄, suggests hypertrophy of the low right paraseptal region of the RV;
- Initial q wave disappears, decrease of R voltage and increase of S depth in V₅ and V₆ are observed in Complete RBBB associated to great RVH;
- Pattern of Incomplete RBBB or Complete RBBB of sudden onset, suggests acute RVH by pulmonary embolism;
- Presence of P wave criteria of RAE associated to Complete RBBB suggests RVH, except for Ebstein’s anomaly and tricuspid atresia.
Elements that suggest RVH in $V_1$ in the presence of IRBBB and CRBBB

<table>
<thead>
<tr>
<th>IRBBB QRS duration &lt; 120 ms</th>
<th>CRBBB QRS duration ≥ 120 ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolated IRBBB $V_1$</td>
<td>Isolated CRBBB</td>
</tr>
<tr>
<td></td>
<td>$V_1$</td>
</tr>
<tr>
<td>RsR'</td>
<td>rsR'</td>
</tr>
<tr>
<td>$R' &lt; 10$ mm</td>
<td>$R' &lt; 15$ mm</td>
</tr>
<tr>
<td>IRBBB + RVH</td>
<td>CRBBB + RVH R' &gt; 15 mm</td>
</tr>
<tr>
<td>$V_1$</td>
<td></td>
</tr>
<tr>
<td>$R' &gt; 10$ mm</td>
<td>$R' &gt; 15$ mm</td>
</tr>
</tbody>
</table>

Voltage criteria of $R'$ in $V_1 > 10$ mm for IRBBB and $> 15$ mm for CRBBB that indicates associated RVH.
### VCG criteria of CRBBB associated to RVH on HP (1)

<table>
<thead>
<tr>
<th>CRBBB + Mild RVH</th>
<th>CRBBB + Moderate RVH</th>
<th>CRBBB + Severe RVH</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Diagram" /></td>
<td><img src="image2" alt="Diagram" /></td>
<td><img src="image3" alt="Diagram" /></td>
</tr>
</tbody>
</table>

**CRBBB VCG Grishman type or Kennedy type I**
- CCW rotation

**CRBBB VCG Cabrera type or Kennedy type II**
- In 8 rotation

**CRBBB VCG Kennedy type III or C**
- CW rotation

1. A CW rotation of the QRS loop in the HP, 2. A ratio of the magnitude of the R wave to that of the S wave (R/S ratio) in lead X at less than 2.0, 3. A mean QRS vector in lead X more negative than $-10 \text{ mv.msec}$, or 4. A maximal QRS vector located between $90^\circ$ and $-90^\circ$ in the HP. In contrast, an R/S ratio in lead X that was $\geq 2.0$ or an azimuth angle of the mean spatial QRS vector that was not between $90^\circ$ and $\pm 180^\circ$ would indicate that the right ventricular conduction defect is probably uncomplicated (2).
Clinical diagnosis: Emphysema and systemic hypertension
ECG diagnosis: SR, HR: 78 bpm P wave: SÂP: +63°; duration: 80 ms; Voltage: 1 mm. PR: 172 ms.
QRS: SÂQRS: with extreme deviation in the right superior quadrant; -120°; QRSD: 140 ms; SAT: +50° and to the back; QT: 430 ms; QTc: 490 ms.
Note: The diagnosis of LAFB and/or inferior electrically inactive area is not configured. The initial forces are directed to left and upward. The greatest part of QRS loop located in the right superior quadrant rules out LAFB (in spite of its CCW rotation). The fast recording of QRS loop onset in the FP and the corrected aspect of the efferent branch rule out the diagnosis of inferior Myocardial Infarction. In spite of the extreme deviation of the QRS axis in the superior quadrants, associated LAFB is not configured, even with a CCW rotation. RECD is indicative of CRBBB,
CRBBB Kennedy
Type III VCG type: anterior dislocation of QRS loop with CW rotation + PAF

RVH

Monophasic R waves with notch from V1 to V3: CRBBB + PAF (Prominent Anterior Forces).

Initial 10 to 20 ms vector directed to front: rules out associated LSFB
ECG/VCG correlation on RSP
Diagnostic conclusion: ECG/VCG

1) CRBBB VCG Kennedy type III;
2) RVH;
3) Prominent Anterior Forces (PAF).

Comment: by VCG in the HP, CRBBB may be:
1) Kennedy type I or Grishman (afferent branch behind the X line);
2) Kennedy type II or Cabrera (afferent branch in front of the X line with loop in 8);
3) Kennedy type III (QRS loop of clockwise rotation and completely located in anterior quadrants in the HP).

References