Wide Complex Tachycardia

David Stultz, MD, FACC
Differential Diagnosis of Wide Complex Tachycardia

- Supraventricular tachycardia with aberrancy
  - Underlying bundle branch block
  - Rate dependent aberrancy
  - Electrolyte abnormalities (hyperkalemia)
- Ventricular tachycardia
  - Polymorphic
  - Monomorphic
- Bundle branch re-entrant tachycardia
- Pacemaker mediated tachycardia
- Artifact
EKG Features

- There are no normal-looking QRS complexes.
- Rate: Greater than 100 beats/minute and usually not faster than 200 beats/minute.
- Rhythm: Usually regular but may be irregular.
- P waves: In rapid VT the P waves are usually not recognizable. At slower ventricular rates, P waves may be recognized and may represent normal atrial depolarization from the sinus node at a rate slower than VT, but the electrical activities do not affect one another.
- QRS, ST segment, T wave:
  - The PVC is premature; i.e., it must occur before the next expected sinus beat unless atrial fibrillation is present since preactivity cannot be assessed.
  - The width of the QRS is 0.12 second or greater.
  - The QRS morphology is often bizarre, with notching.
  - The ST segment and T wave are usually opposite in polarity to the QRS.
  - When multiformed (or multifocal), the coupling interval and morphology of the QRS vary.
Surface EKG Criteria

- Atrioventricular dissociation
- QRS axis between -90 degrees and plus or minus 180 degrees
- Positive QRS concordance (positive QRS V1 -V6)
- QRS duration of 140 msec or more with right bundle branch block pattern and 160 msec or more with left bundle branch block pattern
- Combination of left bundle branch block pattern and right axis
- Monophasic or biphasic QRS complex with right bundle branch block pattern and slurred or prolonged S wave in V1 with left bundle branch block morphology
Brugada Criteria for Ventricular Tachycardia

• Lack of an RS complex in the precordial leads
• Longest interval in any precordial lead from the beginning of the R wave to the deepest part of the S wave when an RS complex is present is greater than 100 ms
• Atrioventricular dissociation
• Whether both leads V1 and V6 fulfilled classic criteria for ventricular tachycardia
Morphology Criteria (Brugada)

- **Tachycardia with a right bundle branch block-like QRS**
  - **Lead V1**
    - Monophasic R or QR or RS favors VT
    - Triphasic RSR' favors SVT
  - **Lead V6**
    - R to S ratio <1 (R wave smaller than S wave) favors VT
    - QS or QR favors VT
    - Monophasic R favors VT
    - Triphasic favors SVT
    - R to S ratio >1 (R wave larger than S wave) favors SVT

- **Tachycardia with a left bundle branch block-like QRS**
  - **Lead V1 or V2**
    - Any of following R >30 msec, >60 msec to nadir S, notched S favors VT
  - **Lead V6**
    - Presence of any Q wave, QR or QS favors VT
    - The absence of a Q wave in lead V6 favors SVT

Fusion and Capture Beats

During the course of a tachycardia characterized by widespread, abnormal QRS complexes, the presence of fusion beats and capture beats provides maximum support for the diagnosis of VT.

Braunwald
Ventricular Tachycardia
Pseudo-Ventricular Tachycardia (artifact)
Atrial fibrillation with LBBB
SVT with aberrency (probably AVRT)
Ventricular Tachycardia
Pseudo-Ventricular Tachycardia (artifact)
Slow Ventricular Tachycardia vs 
accelerated Junctional rhythm with LBBB
Pseudo-Ventricular Tachycardia (artifact)
Baseline EKG

SVT with LBBB (Atrial tachycardia)
Pseudo-Ventricular Tachycardia (artifact)
Ventricular tachycardia with defibrillation
Ventricular tachycardia with antitachycardia pacing and ICD shock
Ventricular Tachycardia
Atrial flutter with LBBB
Atrial fibrillation with LBBB (and paced complexes #4 and #5)
Atrial fibrillation with Pseudo-Ventricular Tachycardia (artifact)
Polymorphic Ventricular Tachycardia
Ventricular Tachycardia

Baseline EKG: NSR, RBBB
Pseudo-Ventricular Tachycardia (artifact)
Nonsustained Ventricular Tachycardia
Sinus or ectopic atrial tachycardia with RBBB
Ventricular Tachycardia
SVT (AVNRT) with RBBB
Pseudo-Ventricular Tachycardia (artifact)
Ventricular Tachycardia
Pseudo-Ventricular Tachycardia (artifact)
Ventricular Tachycardia
Polymorphic VT
Long-short-long cycle
Pseudo-Ventricular Tachycardia (artifact)
SVT with aberrancy

Baseline EKG

Previous ECG
Ventricular Tachycardia
Ventricular Tachycardia
Nonsustained Ventricular Tachycardia
Hyperkalemia (K+ 8.1)
Ventricular Tachycardia
SVT converting to Ventricular Tachycardia
17 years
Male
Room:

1. Vent. rate 211 bpm
2. PR interval * ms
3. QRS duration 150 ms
4. QT/QTc 322/603 ms
5. F-R-T axes * -52 116

Technician:

Billing #:

Referred by:  

Unconfirmed:

40 Hz  25.0 mm/s  10.0 mm/mV  2 by 5s  MAC 8002C  12SL 100 x 250
• Atrial Fibrillation with WPW
Slow Ventricular Tachycardia to fast VT – pace terminated
Hyperkalemia (K+ 8.2)

7 minutes after treatment
SVT with aberrency

Baseline EKG