



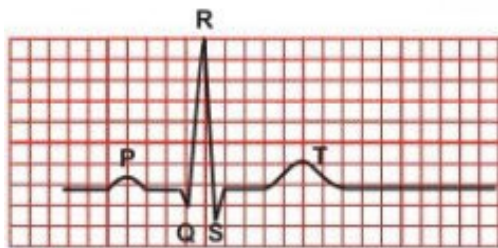
Clinical Pharmacology & Toxicology Pearl of the Week

~ ECG findings in sodium channel blockade toxicity ~

- Some examples of cardiac sodium channel blockers include: tricyclic antidepressants (TCAs), 1st generation antihistamines (diphenhydramine), antimalarials (quinidine, chloroquine, hydroxychloroquine), class 1a and 1c antiarrhythmics (procainamide, flecainide), lamotrigine, carbamazepine, topiramate, antipsychotics (chlorpromazine), propranolol and cocaine.
- Sodium channel blocker poisonings may result in several characteristic ECG changes. The presence of these findings may predict the development of serious toxicity (e.g., seizures, arrhythmias after a TCA ingestion).
- A normal QRS duration is between 80 and 120 ms.
- Sodium channel blocker poisoning may result in several characteristic ECG changes including:
 - Widened QRS (greater than 100 ms)
 - Tall R wave in avR (greater than 3 mm)
 - Deep S wave in lead I
 - Right bundle branch block (RBBB)
 - Terminal 40 ms deviation
- Comparing current ECGs to old ECGs (if available) is critically important to determine the patient's normal QRS duration, presence of a right bundle branch block (RBBB), and to look for other features of sodium channel blockade.

The following figures show ECG findings of sodium channel blockade:

1. Wide QRS complex (greater than 100 ms)

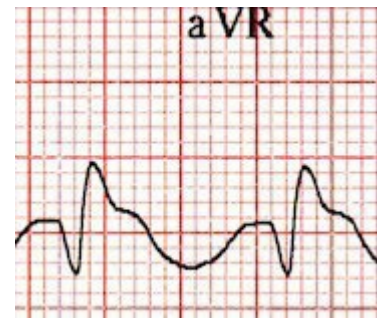
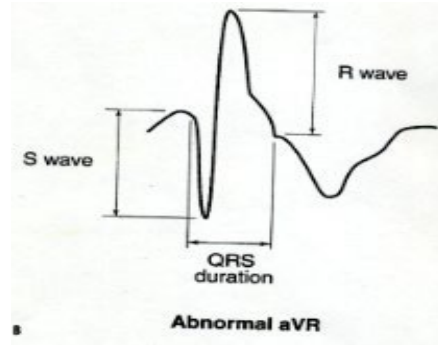
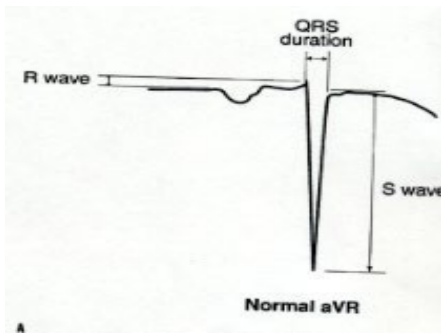


Normal (note: one horizontal box = 40 ms)



Abnormal (Wide QRS)

- In lead aVR, R wave greater than 3 mm tall (1 mm = 1 vertical box), or R wave height divided by S wave height greater than 0.7 (Note: these are the findings that support a “terminal 40 ms deviation” in lead aVR)



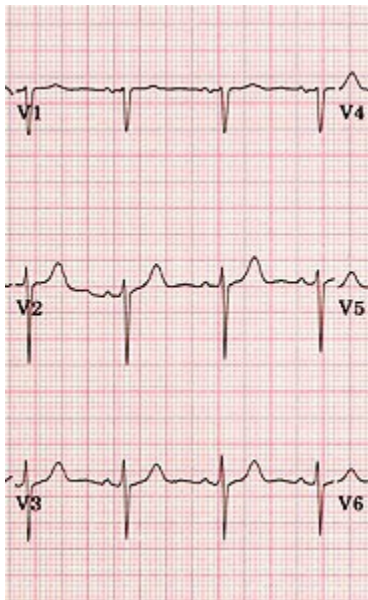
Abnormal (Tall R in aVR)

- Deep, slurred S-wave in lead I

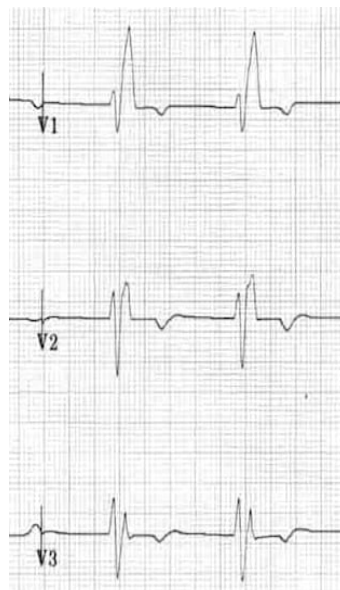


Wide slurred S wave in lead I

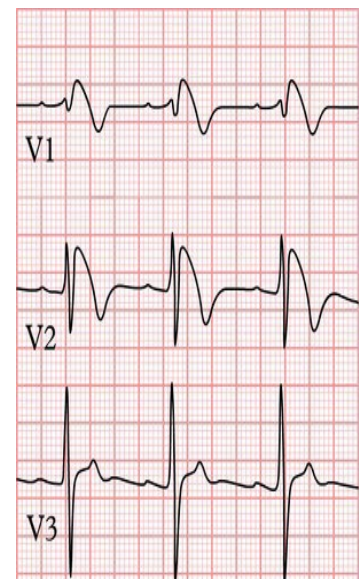
- Right bundle branch block (RBBB) or Type 1 Brugada pattern (RBBB plus ST elevation in leads V1 to V3)



Normal

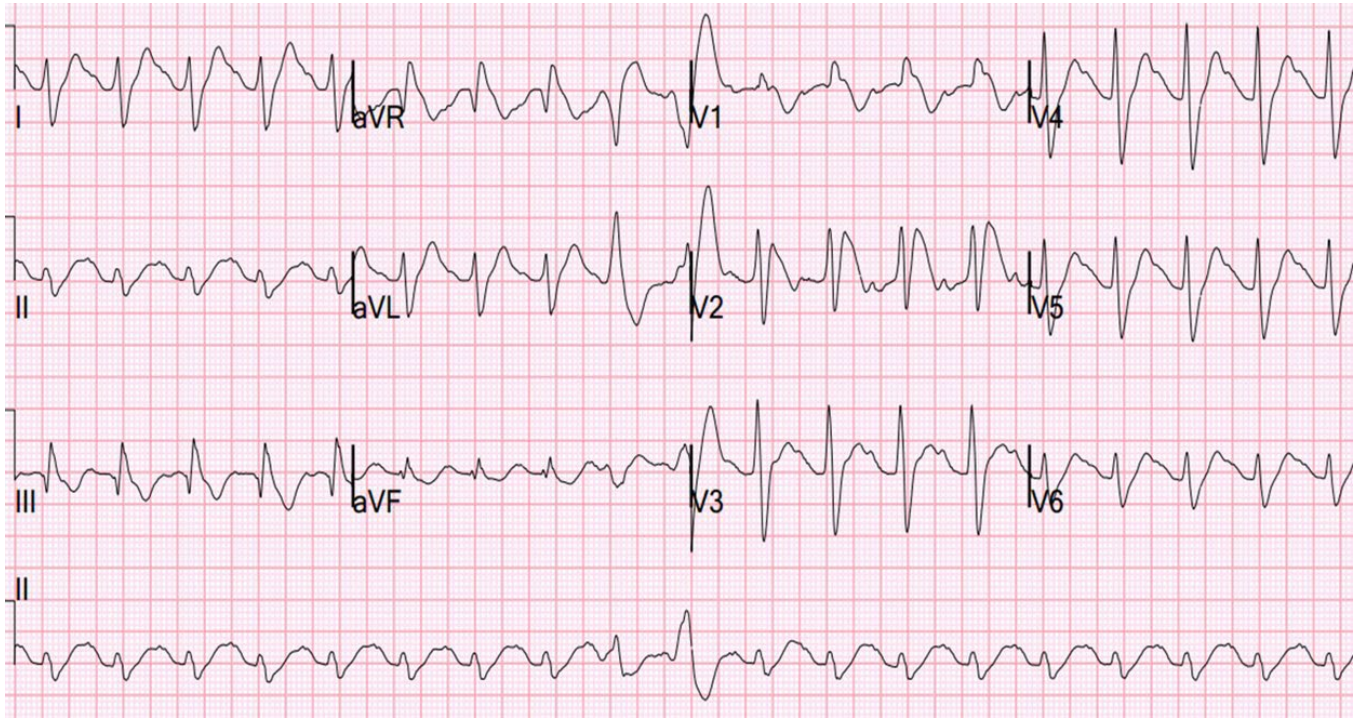


RBBB



Brugada pattern

ECG from a patient with severe sodium channel blocker poisoning:



The Clinical Pharmacology (CP) physician consultation service is available Mon-Fri, 8am-5pm. The on-call physician is listed in ROCA on the AHS Insite page. CP consultations are also available through Netcare e-referral and Specialist Link. You can also find us in the [Alberta Referral Directory](#) (ARD) by searching “Pharmacology” from the ARD home page. Click [HERE](#) for more details about the service.

The Poison and Drug Information Service (PADIS) is available 24/7 for questions related to poisonings. Please call 1-800-332-1414 (AB and NWT) or 1-866-454-1212 (SK). Information about our outpatient Medical Toxicology Clinic can be found in [Alberta Referral Directory](#) (ARD) by searching “Toxicology” from the ARD home page.

More CPT Pearls of the Week can be found [HERE](#).

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