QUESTION 2 Cardiology
A 65-year-old woman presents with a scalp laceration sustained after her second syncopal episode in seven days. She takes metoprolol, simvastatin and amitryptyline for hypertension, hypercholesterolaemia and depression respectively. Cardiovascular examination and all non-invasive cardiac investigations are unremarkable. For which of the following ECG findings is electrophysiology testing least useful for management?
A. Polymorphic ventricular extrasystoles.
B. Paroxysmal atrial fibrillation (rate 110/minute).
C. Significant QT prolongation.
D. Second degree heart block during sleep.
E. Sinus bradycardia.

I have approached the question in these separate headings
1) Evaluation of syncope
   - Causes of syncope
   - Types of syncope
   - History
   - Investigations
2) Indications of Electrophysiology testing
2) Arrhythmias particularly A and C
3) Types of QT syndromes
4) Treatment of QT syndromes

Causes of syncope
1) cardiac - bradycarrhythmia or tachyarrhythmia 23%
2) Neurally mediated 58%- vasovagal
3) Neurologic or psychiatric 1%
4) Unexplained syncope 18%

Types of syncope
1) Vasovagal syncope
   - precipitating events such as fear, severe pain, emotional distress, instrumentation or prolonged standing
2) Situational syncope
   - occurs during or immediately after urination, defecation, cough or swallowing
3) Orthostatic syncope
   - documentation of orthostatic hypotension ass with syncope or presyncope
4) Cardiac ischemia related syncope

Most specific predictors of neurally mediated syncope --abdominal discomfort bf LOC, nausea anad diaphoresis during recovery phase

History is important
1) Associated symptoms
2) Prodrome
3) Position
4) Warning -without warning→ arrhythmic
5) Preceding events
6) Duration of symptoms.  
7) Recovery  
   - prolonged recovery suggest a vagal event  
   - significant neurologic changes or confusion during recovery period maybe due to stroke or seizure  
8) Witness  
9) Exertional syncope  
   - ventricular tachycardia & obstruction (AS or HCOM)  
10) Age  
   - neurocardiogenic more likely to occur among young  
   - although long QT syncrome or HCOM can also occur in the young  
11) Pre existing medical conditions  
12) Injury  
13) Medications  
14) Eating  
   - vagal surge upon swallowing can cause bradycardia and hypotension in predisposed patient  

Investigations:  

1) ECG:  
According to European Society of Cardiology ECG abnormalities suggesting an arrhythmic cause of syncope  
   1) Bifascicular block- LBBB or RBBB combined with left anterior or left posterior fascicular block  
   2) Intraventricular conduction abnormalities (QRS duration > 0.12s)  
   3) Mobitz II second degree atrioventricular block  
   4) Asymptomatic sinus bradycardia (<50bpm) or sinoatrial block  
   5) Preexcited QRS complexes (preexcitation syndrome)  
   6) Prolonged QT interval  
   7) ECG typical of Brugada syndrome (RBBB pattern with ST elevation in lead V1-V3)  
   8) ECG suggestive of arrhythmogenic R ventricular dysplasia (-ve T waves in R precordium, epsilon waves and ventricular late potentials)  
   9) Q waves suggesting MI  

2) Holter monitor  

3) Echocardiography  
   - dx underlying structural heart disease eg. L ventricular dysfunction, HCOM, AS  

4) Neurologic tests  
   - eg EEG, CT brain, MRI brain, carotid Doppler U/S  
   - testing was rarely useful.  

5) Exercise testing  
   - role in pts with a hx of exertion-related syncope or exercise induced arrhythmias  
   - failure to shorten QT interval with exercise may be a sign of congenital prolonged QT syndrome when abnormality is not apparent on ECG  

6) Upright tilt table test  
   - indicated in cases of unexplained single syncopal episodes in high risk settings (potential risk of physical injury or occupational implications) or recurrent episodes after cardiac causes of syncope have been excluded.
Year 2005 Paper two: Questions supplied by Ilynn

- if syncope is reproduced, attributable to neurocardiogenic

7) **Brain natriuretic peptide**
   - released from myocardial cells in response to volume expansion and increased cardiac wall stress
   - a plasma BNP \( \geq 40 \) identified cardiac syncope with a sensitivity and specificity of 82 and 92%.

8) **Electrophysiology**
   - to determine presence of extra electrical pathway
   - extra electrical pathway can be located and destroyed

*Indications for cardiac electrophysiologic study*
- Diagnosis and management of bradyarrhythmias
- To acquire corroborative data in symptomatic patients with episodic bradyarrhythmia
- Define the level of atrioventricular (AV) conduction abnormality
- Diagnosis and management of tachyarrhythmias
- To define the mechanism of narrow-complex tachycardia
- To define the mechanism of wide-complex tachycardia
- To reproduce the clinically documented narrow or wide-complex tachycardia for mapping and transcatheter ablation
- Syncope of unknown etiology
- To assess the sinus node function, the AV conduction, and to search for inducible sustained ventricular tachyarrhythmias in patients with syncope and organic heart disease

**Arrhythmias that I don't know much about:**

1) Polymorphic ventricular extrasystoles

Extrasystole means premature beats therefore the polymorphic ventricular extrasystoles is also known as ventricular premature beats (VPB)
Caused by various different reentrant circuits
Varying coupling cycles between the sinus beats and the VPB

![EKG Image](image)

wide QRS with duration >0.16s

This question mentions significant long QT interval indicating that we know the diagnosis already and it is a medical emergency and should be treated straight away. Electrophysiology testing will not be required for diagnosis or treatment ie ablation)
2) **Long QT syndrome:**
- congenital or acquired
- ass with polymorphic ventricular tachycardia ie Torsade de pointes

**Cause of acquired LQTS**
- medications → antiarrhythmic drugs, nonsedating antihistamines, macrolide antibiotics, antipsychotics, antidepressants
- electrolyte disorders → hypokalaemia, hypomagnesemia, hypocalcemia, renal/liver impairment
- structural heart disease
- stroke, brain injury
- HIV infection
- eating disorders

**Treatment of torsade de pointes due to long QT syndrome**

**Acquired LQTS**

**Pharmacologic:**
- Magnesium sulfate (2g IV blous of 50% Mg sulfate)
- Isoproterenol (2mcg/min titrate to achieve HR 100bpm)
- Lidocaine
- Phenytoin
- Sodium bicarbonate (for quinidine-related arrhythmia)
- Atropine
- Amiodarone (?)

**Nonpharmacologic**
- Temporary pacing (atrial or ventricular) -- if don't respond to Mg sulfate

**Congenital LQTS**

**Pharmacologic**
- Beta blockers
- Mexiletine (?)

**Nonpharmacologic**
- Permanent dual chamber pacemaker
- Left cardiac sympathetic denervation (cardiothoracic sympathectomy)
- Implantable cardioverter-defibrillator