LIFE THREATENING ECG in OUTDOOR SETTING

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Is it normal ???

- Almost 6% of patients presenting with demonstrable echocardiographic evidence of HCM had a normal ECG at the time of diagnosis
- 7.5% of patients having normal ECG have Heart failure.

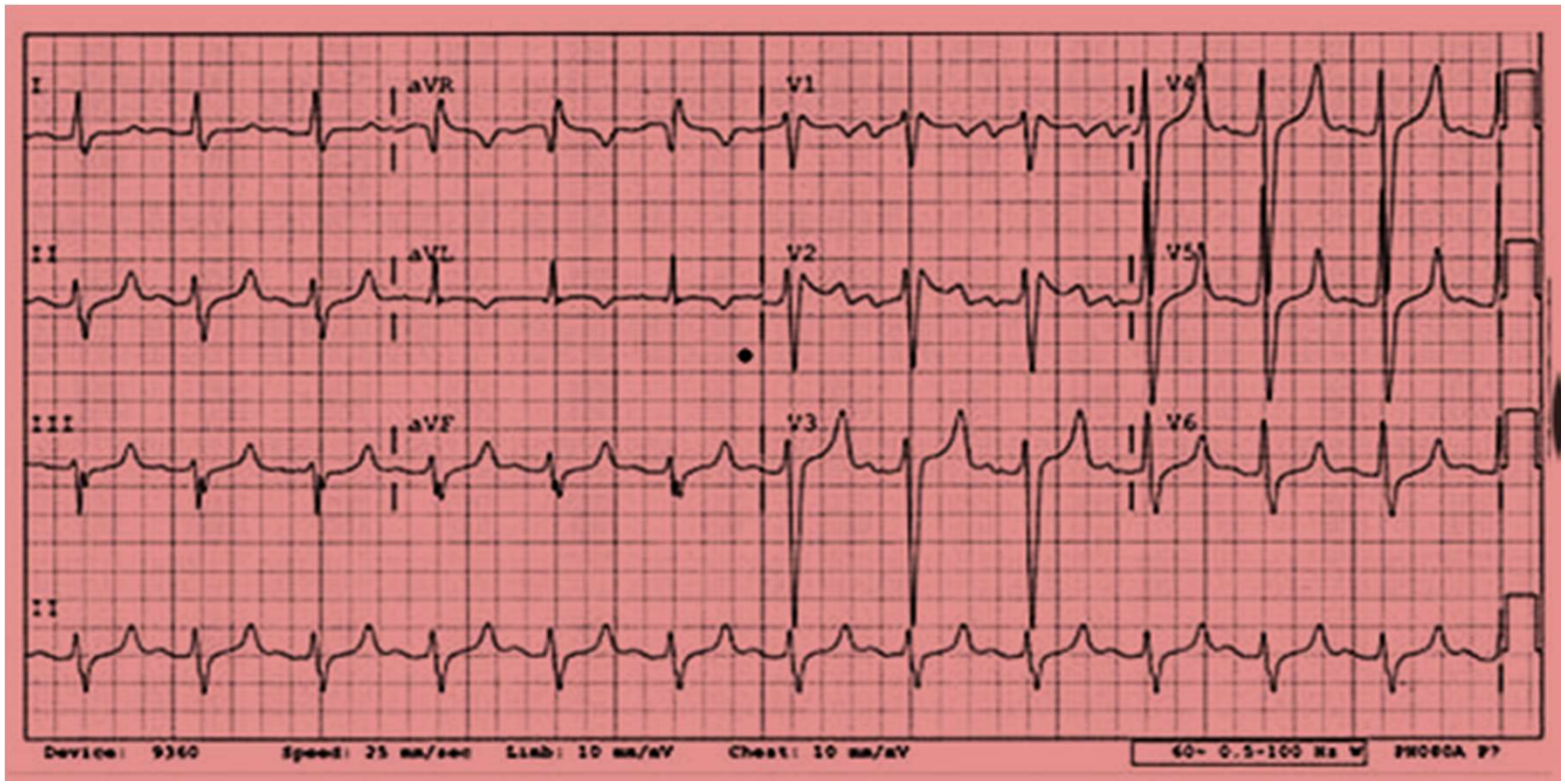
Knowledge and skill

- Junior doctors' confidence levels at interpreting ECGs in stressful-30% not confident in dealing with blocks and flutters. (BMJ journal, 6th Nov 2019)
- 60% nurses working in emergency having good knowledge of arrhythmia but majority (84%) scored poorly during skill performance.

Case scenario 1

- A 65-year-old woman presents to the emergency department (ED) with generalized fatigue and palpitations. She was started on an angiotensin-converting enzyme (ACE) inhibitor 2 months ago but has missed her follow-up appointments. What life-threatening metabolic abnormality could be responsible for the findings shown in her electrocardiograph (ECG) tracing?

ECG 1


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
Device: 9360
Speed: 25 mm/sec
Limb: 10 mm/mV
Chest: 10 mm/mV
60~ 0.5-100 Hz W
PH0904A P?

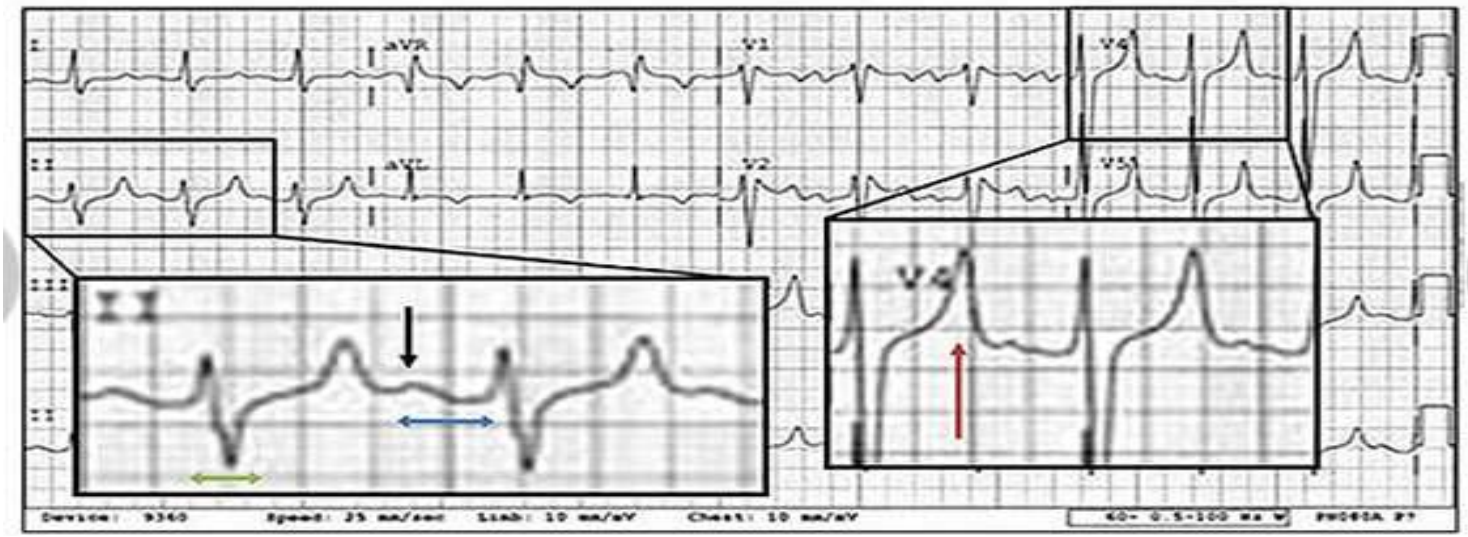
ECG findings-

- Prolongation of the PR interval
- Broad QRS complexes (~120 ms)
- Symmetrically peaked T waves in V2-4

Diagnosis:

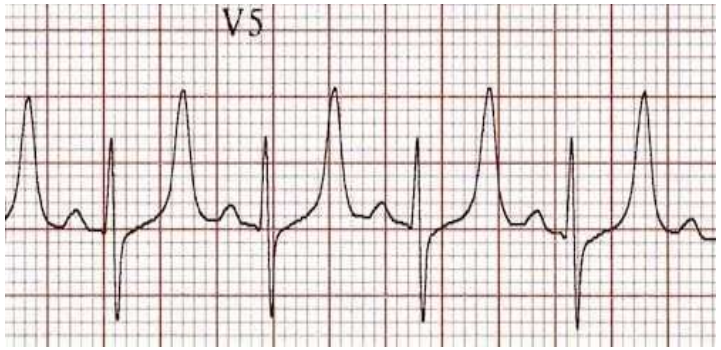
Severe hyperkalaemia (K-7.9mmol/L)

ECG changes

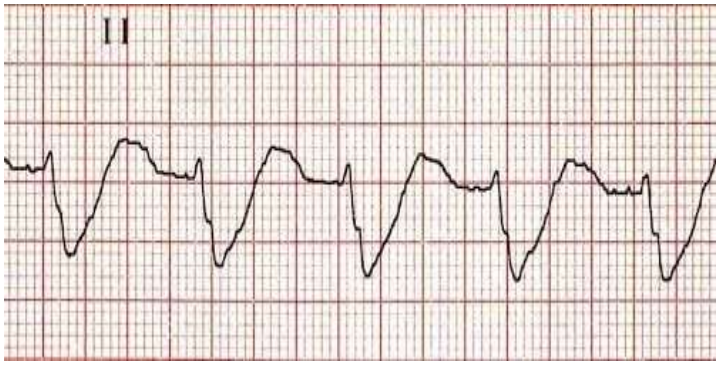


A flattened P wave- ***black arrow***
a prolonged PR interval - ***blue double-headed arrow***
borderline widened QRS complexes -***green double-headed arrow***
pointed, narrow, and tented tall T waves - ***red arrow***

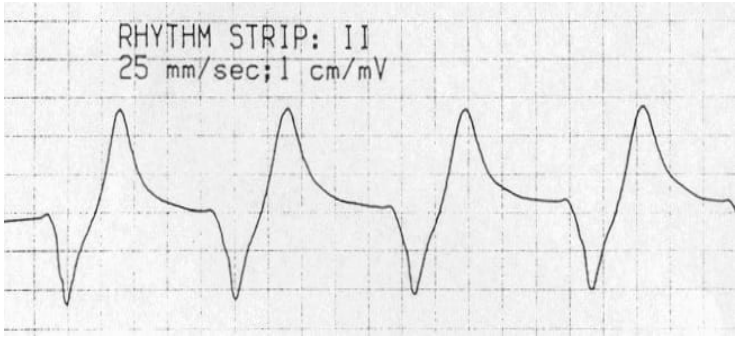
ECG changes



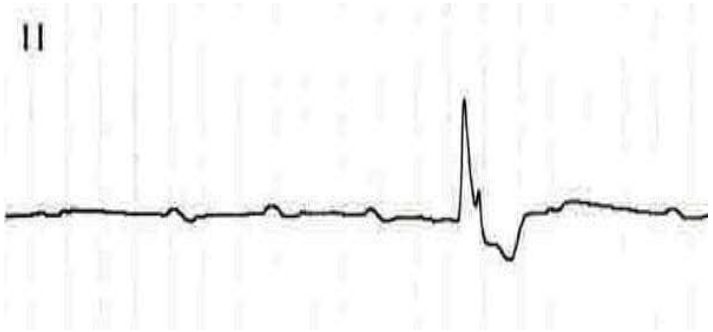
Tall peaked T waves



Broad QRS



Sine wave



Complete heart block

No electrocardiographic changes despite markedly elevated serum potassium

- Case reports suggest patients with renal insufficiency may have no electrocardiographic changes despite markedly elevated serum potassium.
- In a prospective series, **46%** of patients with hyperkalemia were noted to have electrocardiographic changes, but no clear criteria were presented.

–(Retrospective Review of the Frequency of ECG Changes in Hyperkalemia Brian T. Montague, Jason R. Ouellette and Gregory K. Buller CJASN March 2008, 3 (2) 324-330; DOI: https://doi.org/10.2215/CJN.04611007)

Profound Hyperkalemia Without Electrocardiographic Manifestations

Two cases of severe hyperkalemia (> 9.0 mEq/L) was reported in which the ECGs did not reveal the expected manifestations of hyperkalemia

(American Journal of Kidney Diseases Volume 7, Issue 6, June 1986, Pages 461-465

Profound Hyperkalemia Without Electrocardiographic Manifestations Harold M.SzerlipMDJamesWeissMDIrwinSingerMD)

ECG is not a sensitive method of detecting hyperkalemia

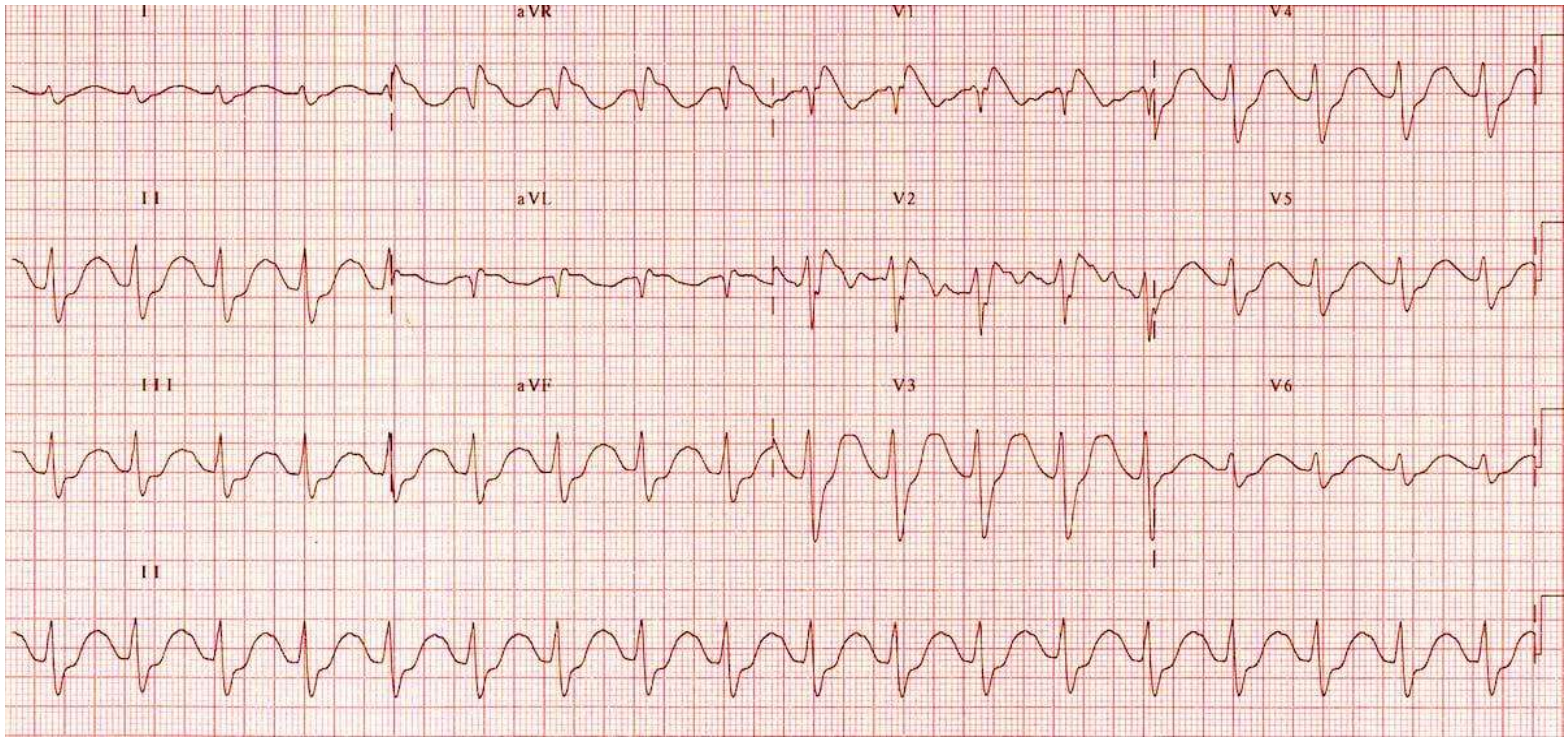
- The specificity of the ECG is better for hyperkalemia, but empiric treatment of hyperkalemia based on the ECG alone will lead to mistreatment of at least **15%** of patients.

-(The ability of physicians to predict hyperkalemia from the ECG
Author links open overlay pane, FACPKeith DWrennMD, FACP, FACEPCorey MSlovisMD, MSHSBonnie Sslovis)

Case scenario 2

- A 51-year old male presents to Janus General, a rural ED about 100 km from the nearest tertiary care centre. Five hours prior to presentation he ingested approximately 60 tablets of Amitryptilline (50 mg tablets). Upon arrival in the ED he is confused and combative. Initial vital signs are BP 55/30 to 93/60, HR 135, RR 24, Temperature 37.4. Capillary glucose is normal. ECG is shown afterwards.

ECG 2



ECG findings-

- Tachycardia (~ 110 bpm)
- Sinus tachycardia, with P waves embedded in each T wave
- Broad QRS complexes (120 ms, or 3 small squares)
- Positive R’ wave (>3mm) in lead aVR

Diagnosis-

- Poisoning with a tricyclic antidepressant

Sodium channel blocking agents include:

- Tricyclic antidepressants (most common)
- Local anaesthetics, including cocaine
- Type Ia + Ic antiarrhythmics (quinidine, procainamide, flecainide)
- Quinine-based antimalarials
- Dextropropoxyphene
- Propranolol

These agents cause seizure and cadiotoxicity (hypotension, broad complex tachycardia) in overdose.

Management-

1) Rescucitation and separation from the source
2) NaHCO3 infusion (2 mmol/kg IV repeated every 1-2 minutes to restore a perfusing rhythm)
3) Manage hypotension
4) Manage seizure

Patient Case Report

Delayed Cardiotoxicity From a Massive Nortriptyline Overdose Requiring Prolonged Treatment

Journal of Pharmacy Practice
1-5

DOI: 10.1177/0897190019838700
journals.sagepub.com/home/jpp
SAGE

Pansy Elsamadisi, PharmD, BCPS, BCCCP[1], Alyssa Sclafani, MD[2], and Ifeoma Mary Eche, PharmD, BCPS, BCCCP, CACP[1]

Abstract

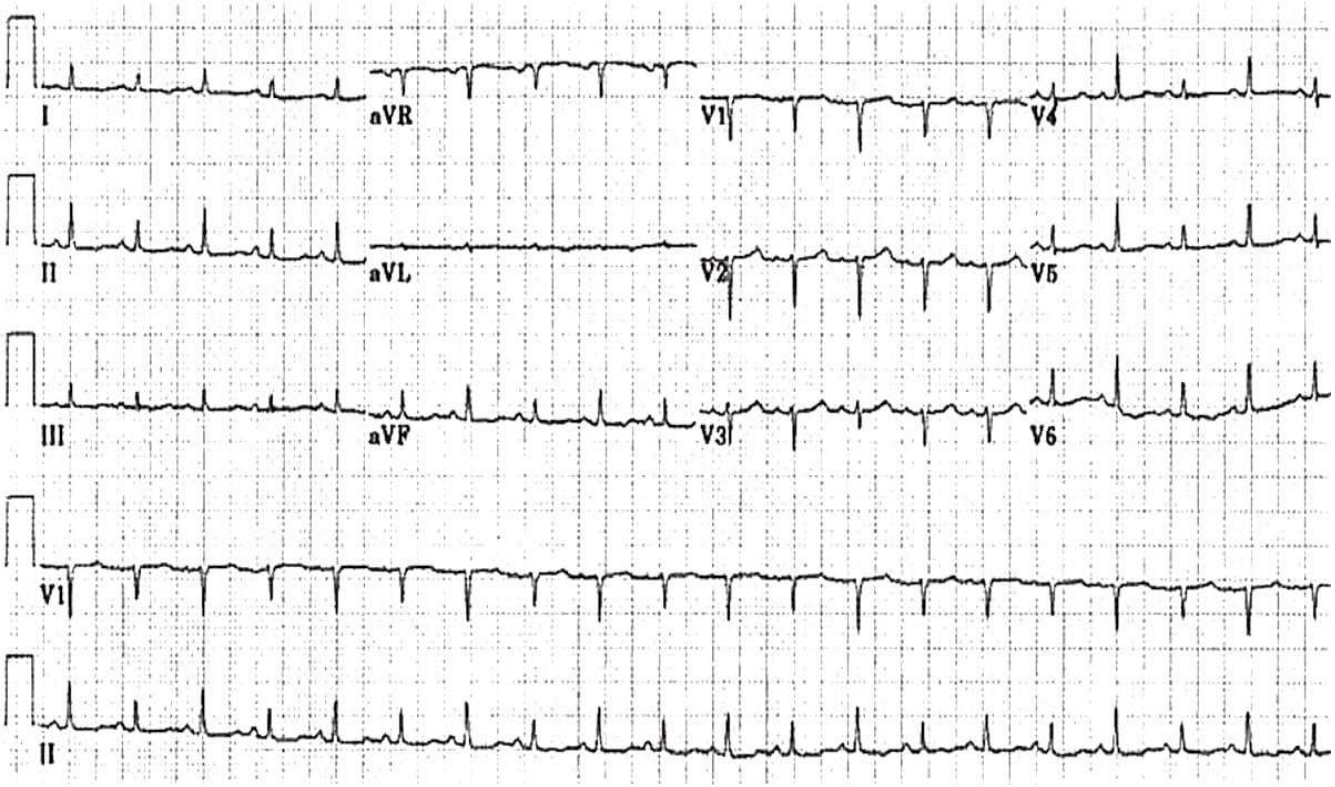
Purpose: A case of a nortriptyline overdose complicated by delayed ventricular arrhythmias necessitating prolonged sodium bicarbonate infusion is presented, along with a review of tricyclic antidepressant (TCA) toxicology and key concepts for massive overdose management. **Summary:** A 61-year-old man presented after an intentional nortriptyline overdose with a possible consumption of up to 2500 mg of nortriptyline. Electrocardiogram on presentation demonstrated QRS widening to 240 milliseconds. Despite treatment with a sodium bicarbonate infusion and further narrowing of his QRS interval, his course was complicated by repeated episodes of wide complex tachycardia. Given these episodes, an elevated quantitative serum nortriptyline level of 468 µg/L on hospital day 6 and persistently positive TCA urine screens, the patient was continued on a sodium bicarbonate infusion until hospital day 14. Based on our patient's quantitative serum nortriptyline levels, we calculated an elimination half-life of 184 hours, 6 days post ingestion as compared to the reported half-life of nortriptyline of 14 to 51 hours. **Conclusion:** This case demonstrates that at toxic levels of ingestion, routine TCA pharmacokinetics may be unreliable due to

Delayed cardio toxicity causing infusion of sodium bi carbonate infusion for 14 days long !!!!

Case scenario 3

- A 63-year-old male presents to the ED complaining of lightheadedness and palpitations. He is hypotensive, with a systolic blood pressure of 82 mm Hg, as well as tachycardic, with a pulse of 110 beats/min. What life-threatening condition is seen on the ECG tracing?

ECG 3



ECG findings-

- Sinus tachycardia (~120 bpm)
- Low QRS voltages
- Electrical alternans

- Diagnosis-

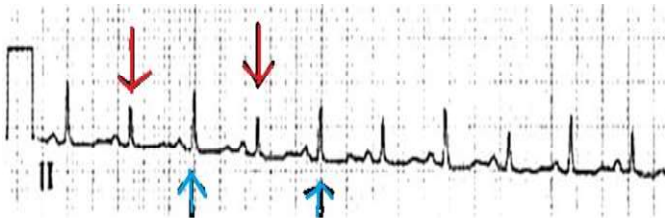
massive pericardial effusion

- Low voltage generally refers to

QRS complex amplitude:

< 5 mm (0.5 mV) in the limb leads

< 10 mm (1 mV) in the precordial leads



- **Electrical alternans** QRS complex height, with alternating taller and shorter QRS complexes. It is thought to be due to the heart swinging backwards and forwards within a fluid-filled pericardial sac.
- **Sinus tachycardia** occurs as a compensatory phenomenon in cardiac tamponade, i.e. to maintain cardiac output in the face of diminishing stroke volume

Unusual cause of recurrent or massive pericardial effusion

- Benign pericardial schwannoma
- POEMS syndrome
- Idiopathic Recurrent Pericarditis
- Erdheim-Chester Disease

–Ji-hun Jang , Jaewon Oh , Hyo Sup Shim , Seok-Min Kang –j-stage (japan)

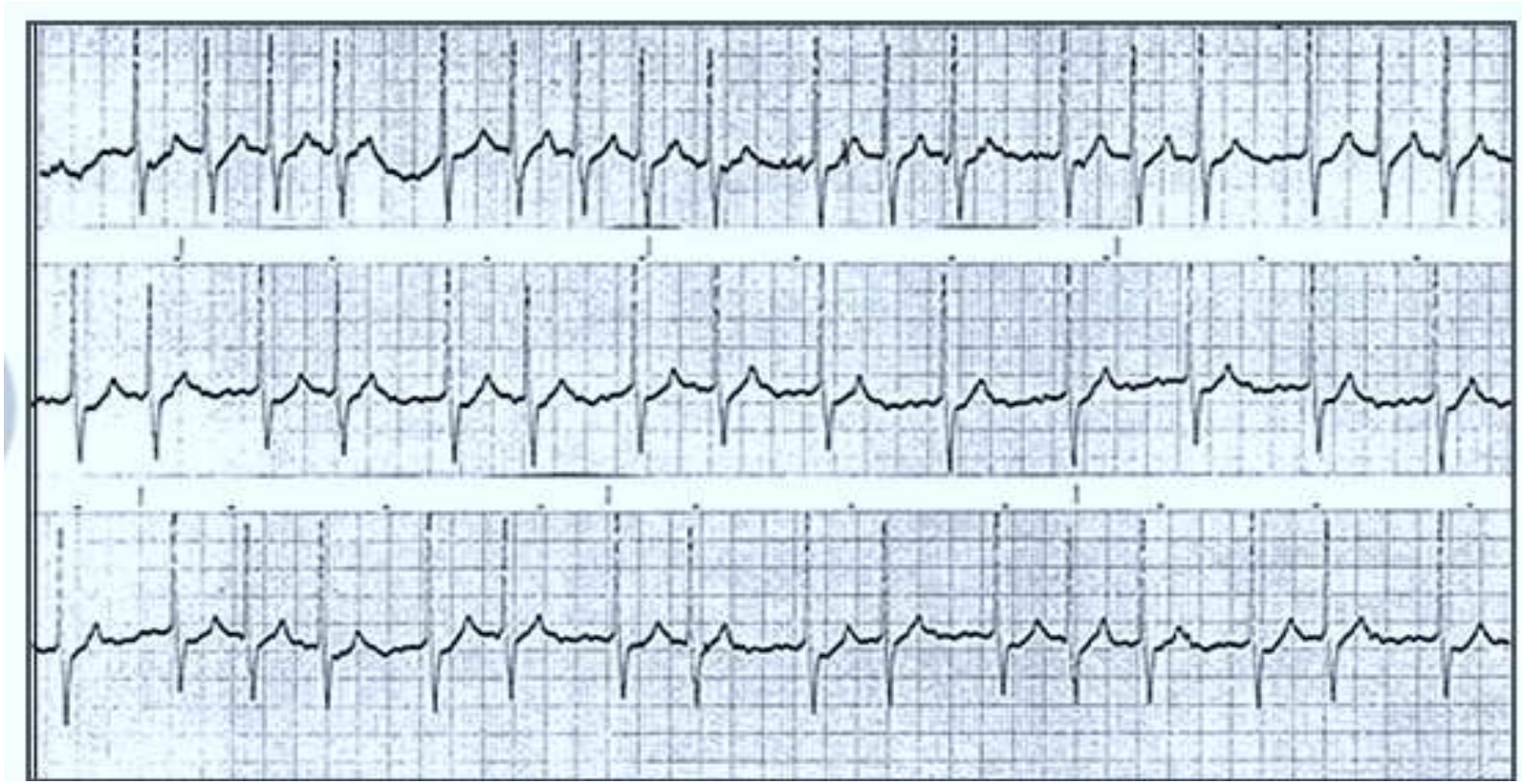
(Cuiling Li MD ,Jingwei Zhang PhD ,Rui Fan MD ,Lili Chen MD , Donghong Liu PhD ,Hong Lin MD-wiley online library)

Liling Lin ,Jian Li, Miao Chen- SN Comprehensive Clinical Medicine November 2019, Volume 1, Issue 11Massimo Imazio,Anna Valenti ,Antonio Brucato ,Alberto Martini- textbook of auto inflammation.

Case scenario 4

A 74-year-old man with mild dementia presents to the ED with worsening confusion. His medications include omeprazole, aspirin, simvastatin, and digitalis. He lives alone at his home, and his daughter comes to visit once a week to lay out his weekly medications. What life-threatening condition could be responsible for the findings shown on his ECG tracing?

ECG 4



ECG findings-

- **Atrial tachycardia**, with regular P waves visible at ~ 160 bpm (many of the P waves are hidden within T waves and VEBs).
- Evidence of **high-grade AV block** — there is a 4:1 conduction ratio between P waves and QRS complexes, with a QRS rate of ~ 40 bpm.
- **Ventricular bigeminy-** Frequent ventricular ectopic beats occurring in a pattern
- **Alternating LBBB and RBBB morphology**, with the conducted QRS complexes demonstrating RBBB morphology (RSR' in V1) and the VEBs demonstrating LBBB morphology (dominant S wave in V1)

- Diagnosis-

severe digoxin toxicity.

Explanations

Characteristic ECG patterns include:

- Atrial tachycardia with high-grade AV block (= the classic dig-toxic rhythm).
- “Regularised AF” = AF with complete heart block + accelerated junctional escape rhythm, producing a paradoxically regular rhythm.
- Bidirectional VT = polymorphic VT with QRS complexes that alternate between left- and right-axis-deviation, or between LBBB and RBBB morphology.

Changing trend of digoxin prescription and decreasing hospitalization

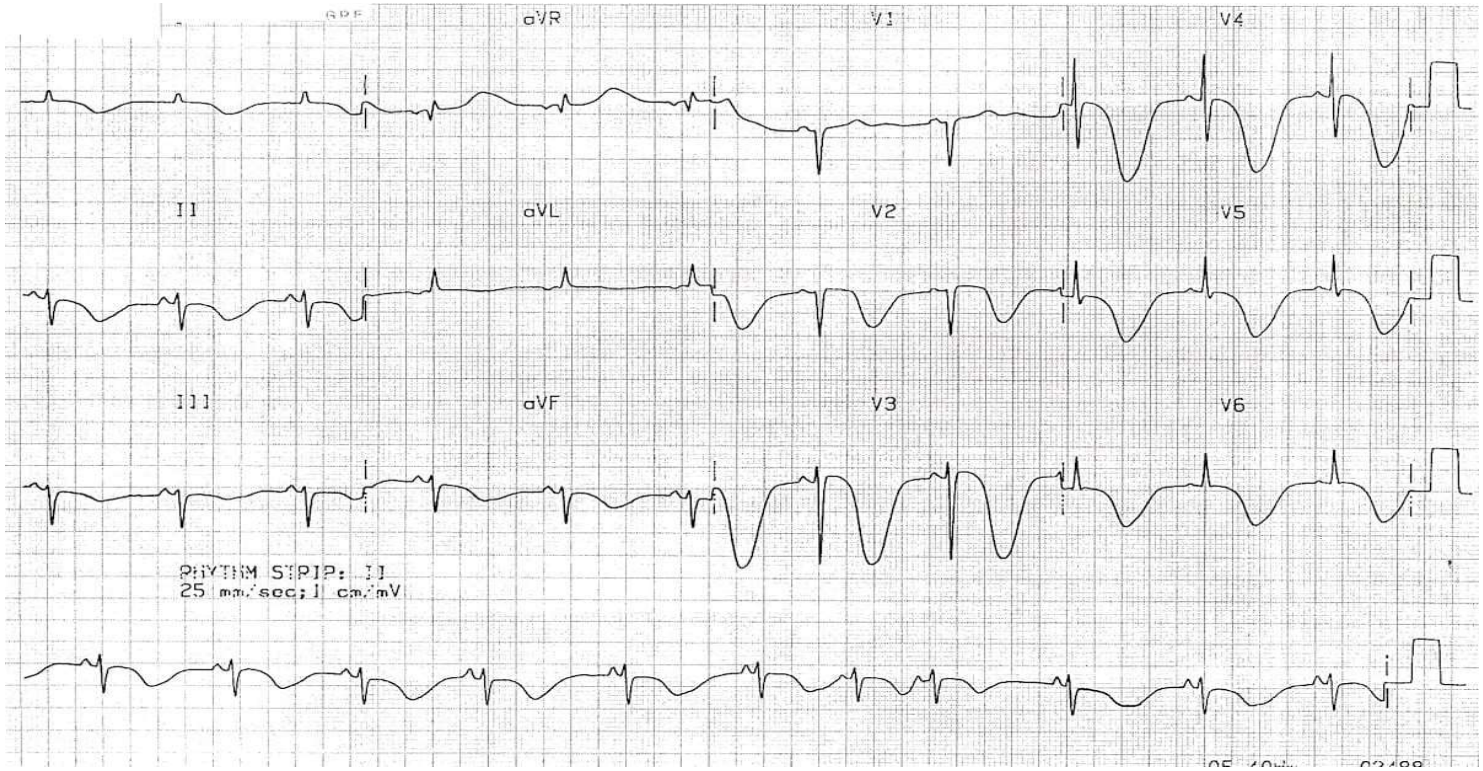
- From 2007 through 2014, the number of digoxin prescriptions dispensed decreased by 46.4%
- From 1999 through 2013, the rate of hospitalizations with a principal or secondary diagnosis of digoxin toxicity decreased from 15 to 2 per 100,000 person-years.
- In-hospital mortality rates associated with hospitalization for digoxin toxicity decreased significantly among from 6.0% to 3.7%
- and 30-day mortality from digoxin toxicity reduced from 14.0% to 10.1%
- Rates of 30-day readmission for digoxin toxicity decreased from 23.5% in 1999 to 21.7% in 2013
- These findings reflect the changing clinical practice of digoxin use, aligned with the changes in clinical guidelines.

-Suveen Angraal, MD[a,1], Sudhakar V. Nuti, BA[b,1], Frederick A. Masoudi, MD, MSPH[c], James V. Freeman, MD, MPH, MS[a,d], Karthik Murugiah, MD[d], Nilay D. Shah, PhD[e], Nihar R. Desai, MD, MPH[a,d], Isuru Ranasinghe, MBChB, MMed, PhD[f], Yun Wang, PhD[a,g] , Harlan M. Krumholz, MD, SM **The american journal of medicine**

Case scenario 5

- A 74-year old male presents with sudden onset of ‘dizziness’ while doing minor chores in his backyard 30 minutes prior. He develops slurred speech and right sided facial paralysis and right sided facial droop.
- He is brought to the local community hospital. His initial vitals are T 37.0 HR 94, BP 198/100, RR 20, 98% room air. Pupils are equal and reactive. What abnormality could be responsible for the findings shown in her electrocardiograph (ECG) tracing?

ECG 5


aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
RHYTHM STRIP: II
25 mm/sec; 1 cm/mV

ECG findings-

- Widespread, giant T wave inversions
- Grossly prolonged QT interval (~ 600ms)

Diagnosis-

Raised intracranial pressure due to Massive intracranial hemorrhage

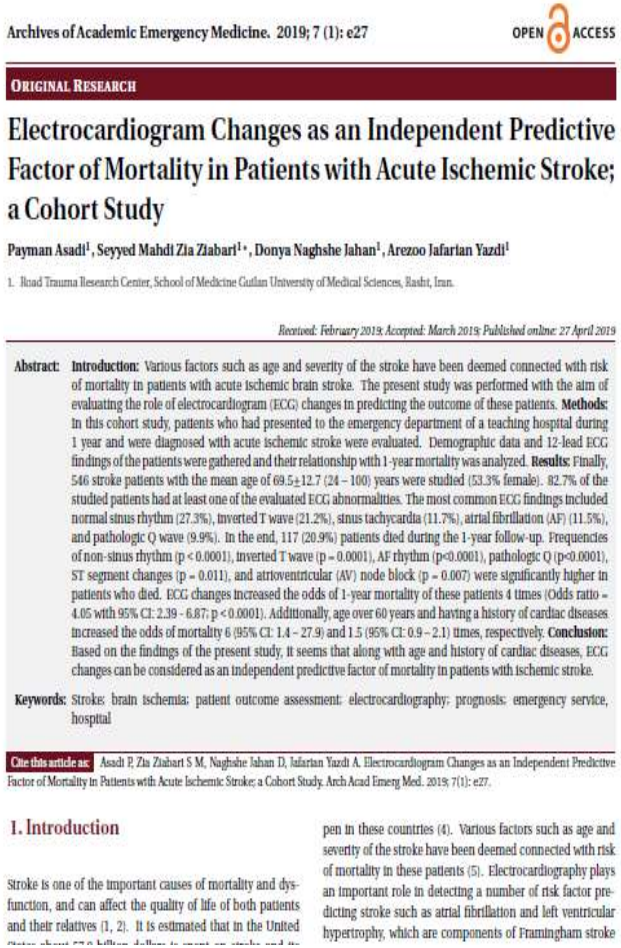
- The differential diagnosis for widespread T-wave inversions and QT prolongation includes myocardial ischaemia (e.g. **Wellen's syndrome**) and electrolyte abnormalities
- Most common finding is long QT

Electrocardiogram Changes as an Independent Predictive Factor of Mortality in Patients with Acute Ischemic Stroke

Frequencies of non-sinus rhythm, inverted T wave, AF rhythm , pathologic Q, ST segment changes, and atrioventricular (AV) node block were significantly higher in patients who died.

ECG changes increased the odds of 1-year mortality of these patients **4 times** (Odds ratio = 4.05 with 95% CI: 2.39 - 6.87; p < 0.0001).

Additionally, age over 60 years and having a history of cardiac diseases increased the odds of mortality 6 (95% CI: 1.4 – 27.9) and 1.5 (95% CI: 0.9 – 2.1) times, respectively.



Archives of Academic Emergency Medicine. 2019; 7 (1): e27

OPEN ACCESS

ORIGINAL RESEARCH

Electrocardiogram Changes as an Independent Predictive Factor of Mortality in Patients with Acute Ischemic Stroke; a Cohort Study

Payman Asadi[1], Seyyed Mahdi Zia Ziabari[1]*, Donya Naghshe Jahan[1], Arezoo Jafartan Yazdi[1]

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Abstract: **Introduction:** Various factors such as age and severity of the stroke have been deemed connected with risk of mortality in patients with acute ischemic brain stroke. The present study was performed with the aim of evaluating the role of electrocardiogram (ECG) changes in predicting the outcome of these patients. **Methods:** In this cohort study, patients who had presented to the emergency department of a teaching hospital during 1 year and were diagnosed with acute ischemic stroke were evaluated. Demographic data and 12-lead ECG findings of the patients were gathered and their relationship with 1-year mortality was analyzed. **Results:** Finally, 546 stroke patients with the mean age of 69.5±12.7 (24 – 100) years were studied (53.3% female). 82.7% of the studied patients had at least one of the evaluated ECG abnormalities. The most common ECG findings included normal sinus rhythm (27.3%), inverted T wave (21.2%), sinus tachycardia (11.7%), atrial fibrillation (AF) (11.5%), and pathologic Q wave (9.9%). In the end, 117 (20.9%) patients died during the 1-year follow-up. Frequencies of non-sinus rhythm (p < 0.0001), inverted T wave (p = 0.0001), AF rhythm (p<0.0001), pathologic Q (p<0.0001), ST segment changes (p = 0.011), and atrioventricular (AV) node block (p = 0.007) were significantly higher in patients who died. ECG changes increased the odds of 1-year mortality of these patients 4 times (Odds ratio = 4.05 with 95% CI: 2.39 - 6.87; p < 0.0001). Additionally, age over 60 years and having a history of cardiac diseases increased the odds of mortality 6 (95% CI: 1.4 – 27.9) and 1.5 (95% CI: 0.9 – 2.1) times, respectively. **Conclusion:** Based on the findings of the present study, it seems that along with age and history of cardiac diseases, ECG changes can be considered as an independent predictive factor of mortality in patients with ischemic stroke.

Keywords: Stroke; brain ischemia; patient outcome assessment; electrocardiography; prognosis; emergency service, hospital

Cite this article as: Asadi P, Zia Ziabari S M, Naghshe Jahan D, Jafartan Yazdi A. Electrocardiogram Changes as an Independent Predictive Factor of Mortality in Patients with Acute Ischemic Stroke; a Cohort Study. Arch Acad Emerg Med. 2019; 7(1): e27.

1. Introduction

Stroke is one of the important causes of mortality and dysfunction, and can affect the quality of life of both patients and their relatives (1, 2). It is estimated that in the United

pen in these countries (4). Various factors such as age and severity of the stroke have been deemed connected with risk of mortality in these patients (5). Electrocardiography plays an important role in detecting a number of risk factor predicting stroke such as atrial fibrillation and left ventricular hypertrophy, which are components of Framingham stroke

The Role of Echocardiography and ECG in Stroke Patients

Among stroke patients 50.3% received EPM and 49.7% routine ECG monitoring.

82.9 % underwent transthoracic echocardiography (TTE), 38.9 % transesophageal echocardiography (TEE) and 25.6 % both procedures.

14/90 TEE pathologies and 1/89 TTE pathology led to a change in therapy, resulting in a number needed to change decision (NNCD) of 12 and 334, respectively.

In comparison, EPM found atrial fibrillation (AF) in 27 of 200 patients, and routine ECG monitoring in twelve of 198 patients, leading to therapeutic changes in all patients (NNCD 8 and 17, respectively).

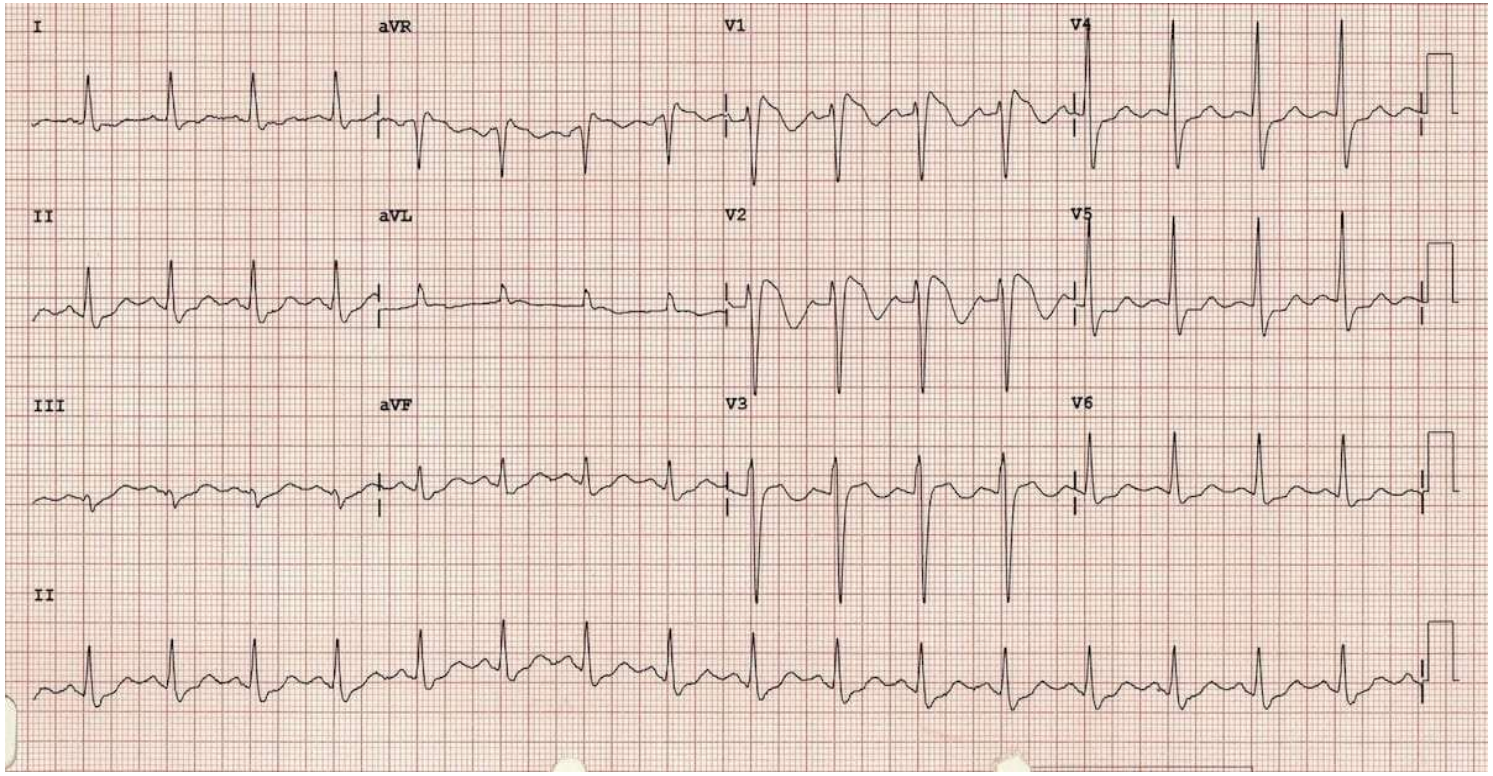
We found a trend towards a higher one-year mortality in patients with pathologic echocardiographic finding

Katrin Wasser, Mark Weber-Krüger, Falko Jürries, Jan Liman, Gerhard F Hamann, Pawel Kermer, Joachim Seegers, Meinhard Mende, Klaus Gröschel, Rolf Wachter **Originally published**30 Jan 2019(**INTERNATIONAL STROKE CONFERENCE 2019 POSTER ABSTRACTS)**

Case scenario 6

A 40-year-old who presented to the emergency department with a 4-day history of fever associated with lower left leg pain, swelling and erythema. Further review of systems was unremarkable. Specifically, the patient denied any history of chest pain, dyspnoea, palpitations, syncope or presyncope. What life-threatening condition could be responsible for the findings shown on his ECG tracing?

ECG 6



ECG finding-

- RBBB-like pattern with secondary R’ wave / J wave following the QRS complex.
- ST elevation at the J point > 2mm with a “coved” morphology — the ST segment slopes diagonally downwards from the J point, with a slight upward convexity best appreciated in V2.
- T wave inversion.

- Diagnosis-

Brugada syndrome

Brugada syndrome

- An inherited arrhythmogenic condition.
- Due to mutation of various genes coding for cardiac sodium and calcium channels (“channelopathy”).
- Inherited as an autosomal dominant trait.
- Most commonly seen in individuals from South East Asia (12/10,000 of the population), particularly males (80% of recorded cases are male), with onset of symptoms typically occurring at age 40.
- Associated with increased risk of paroxysmal ventricular arrhythmias (polymorphic VT, VF) and sudden cardiac death

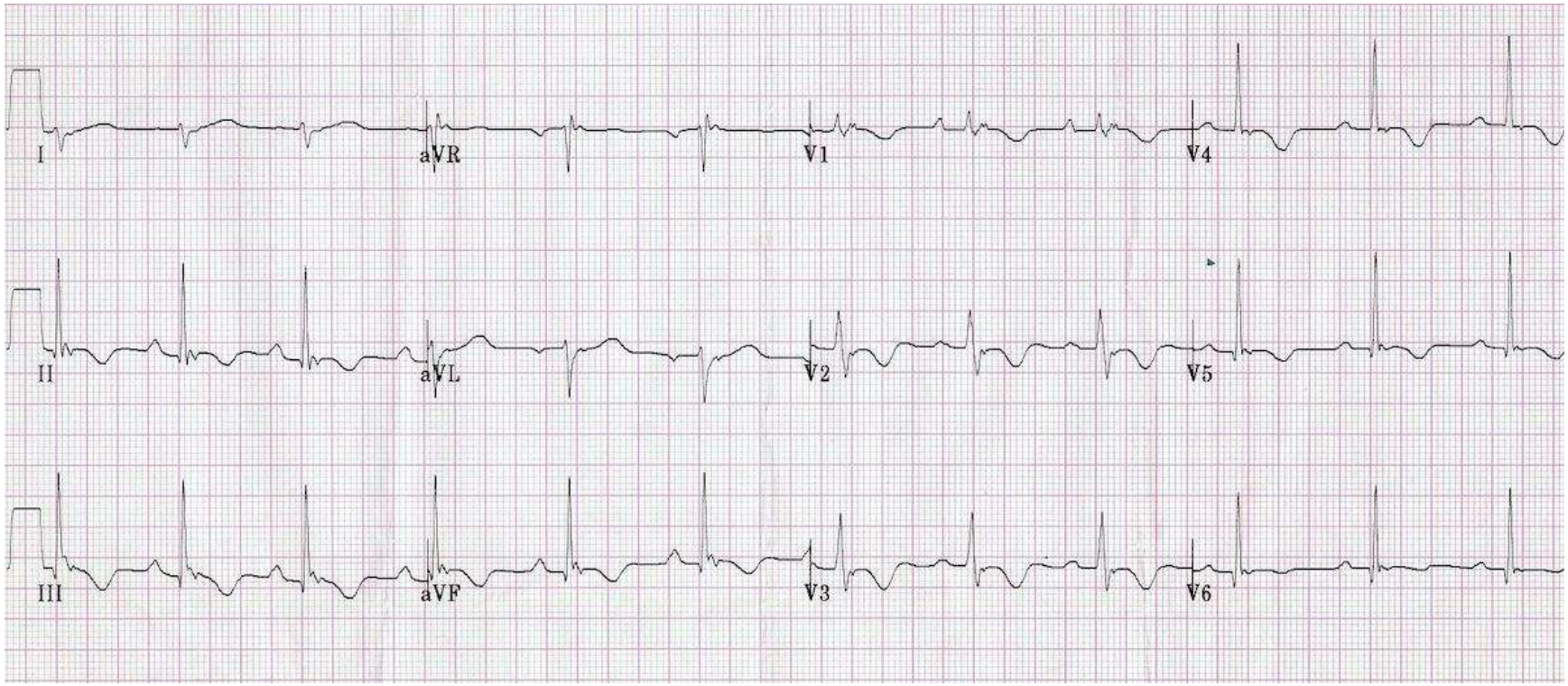
Diagnosis of Brugada syndrome requires both:

- **A diagnostic (Type 1) ECG pattern** – either spontaneously, or during pharmacological challenge with class I antiarrhythmics
- **At least one clinical criterion**
  - **Positive family history**: Sudden cardiac death in family member aged < 45; type 1 ECG pattern in family member.
  - **Arrhythmia-related symptoms**: Cardiac syncope; seizure-like events; nocturnal agonal respirations.
  - **Documented ventricular arrhythmias**: Polymorphic ventricular tachycardia (PVT); ventricular fibrillation (VF).

Case scenario 7

A healthy 33-year-old athletic male was evaluated in cardiology clinic for worsening exertional palpitations and non-specific chest discomfort. What life-threatening condition could be responsible for the findings shown on his ECG tracing?

ECG 7



ECG finding-

- Right axis deviation.
- Dominant R wave in V1.
- Simultaneous T-wave inversions in the inferior (II, III, aVF) and anterior leads (V1-6).
- Subtle widening / slurring of the QRS complexes in V1-3.
- A small blip following each QRS complex, best seen in V1 and the inferior leads — the Epsilon wave.

Diagnosis-

Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC).

Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC)

- An inherited myocardial disease (usually autosomal dominant) associated with paroxysmal ventricular arrhythmias and sudden cardiac death.
- Characterized by fibro-fatty dysplasia of the right ventricular myocardium.
- The second most common cause of sudden cardiac death in young people (after HOCM), causing up to 20% of SCDs in patients < 35 years of age.
- More common in men than women (3:1) and in people of Italian or Greek descent.

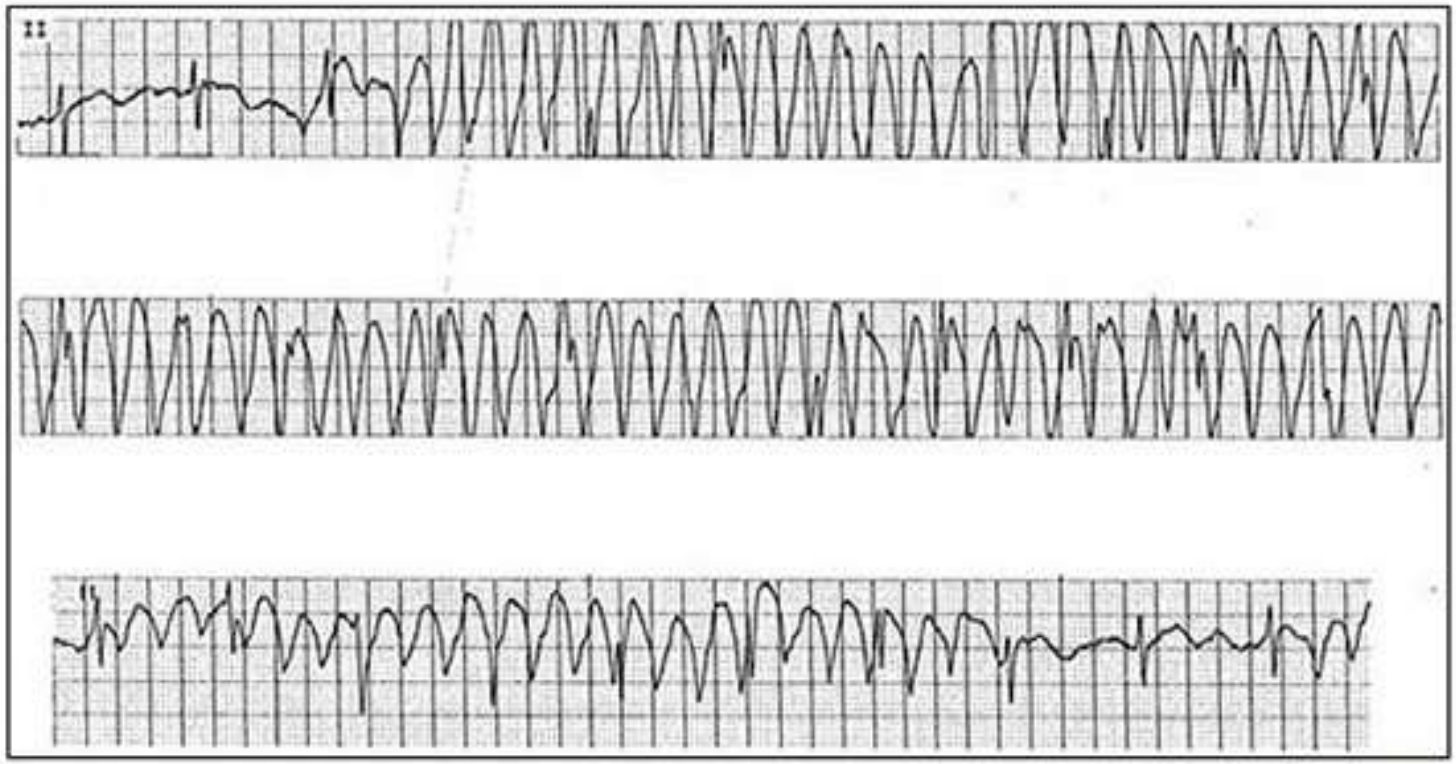
Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC)

- ARVD causes palpitations or syncope due to Right Ventricular VT.
- Symptoms are often precipitated by exercise.
- The first presenting symptom may be sudden cardiac death.
- Over time, surviving patients also develop features of right ventricular failure, which may progress to dilated cardiomyopathy.
- There is usually a family history of sudden cardiac death.

Case scenario 8

A 25-year-old man arrives at the ED with a heavy cough after getting caught outside in a snowstorm while hiking. A routine ECG is performed. What life-threatening condition could be responsible for the findings shown on his ECG tracing?

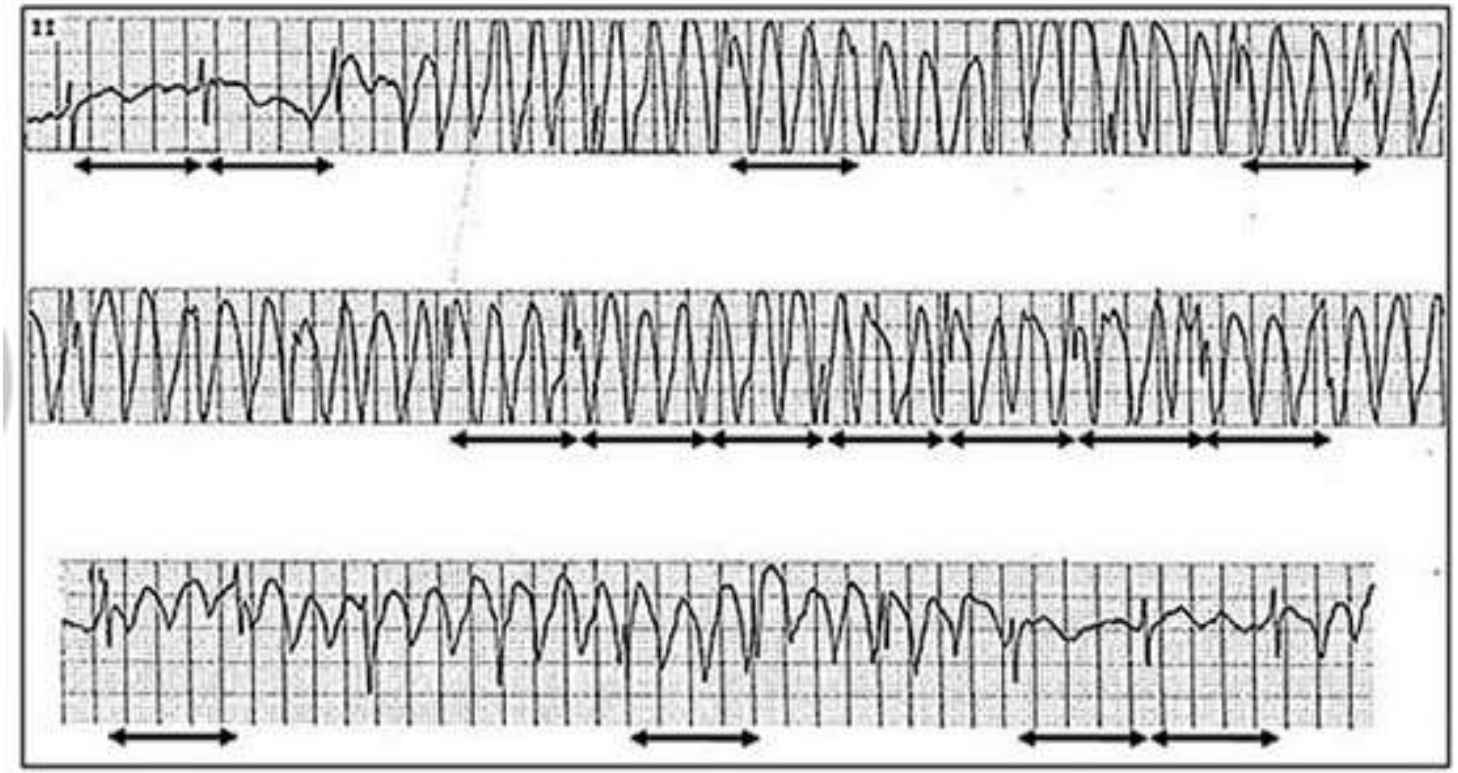
ECG 8



ECG findings:

At first glance, this ECG suggests a run of ventricular tachycardia. (VT)

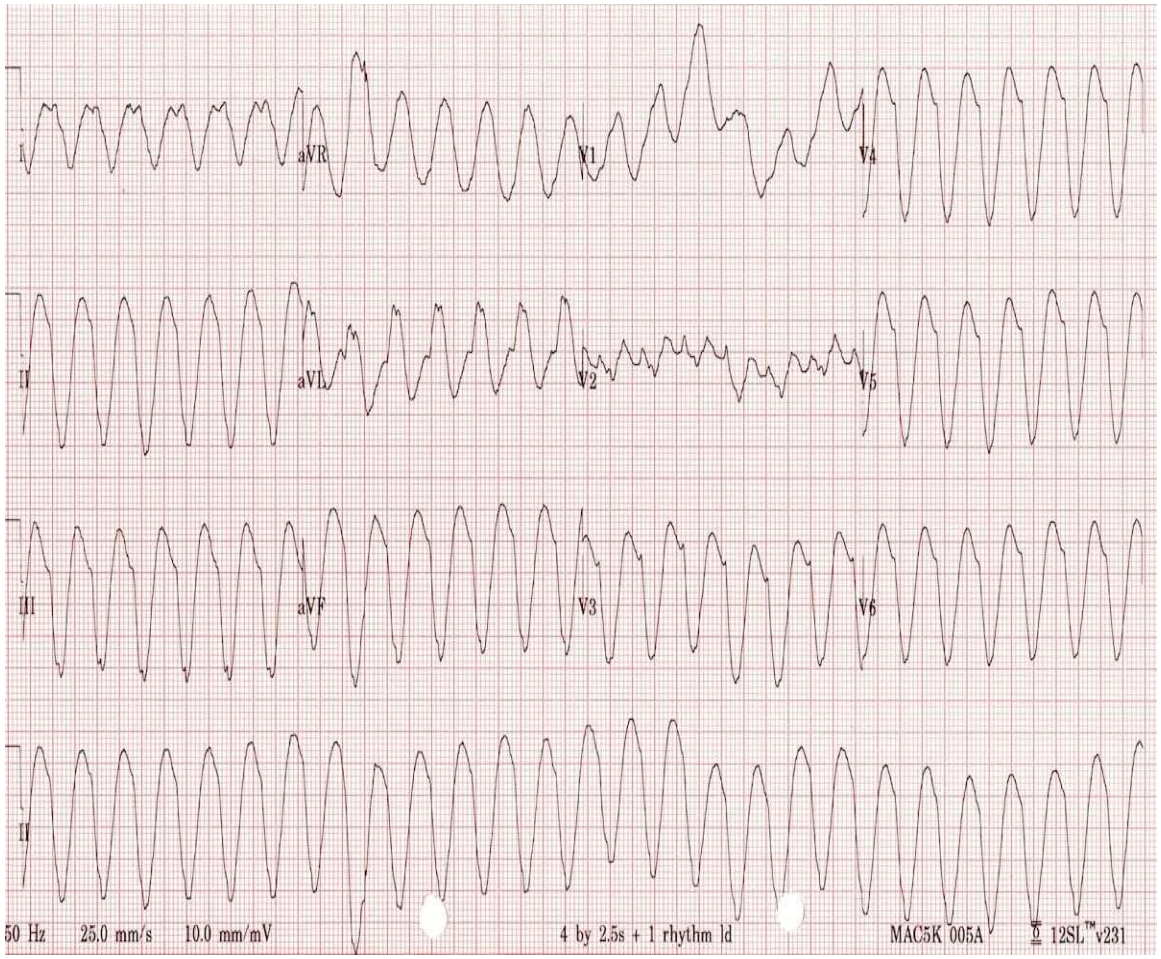
However, sharp deflections occur regularly at the same rate as the sinus rhythm seen at the beginning and at the end of the tracing .These deflections are undoubtedly QRS complexes of the sinus rhythm and provide an example of **an artifact simulating ventricular tachycardia**

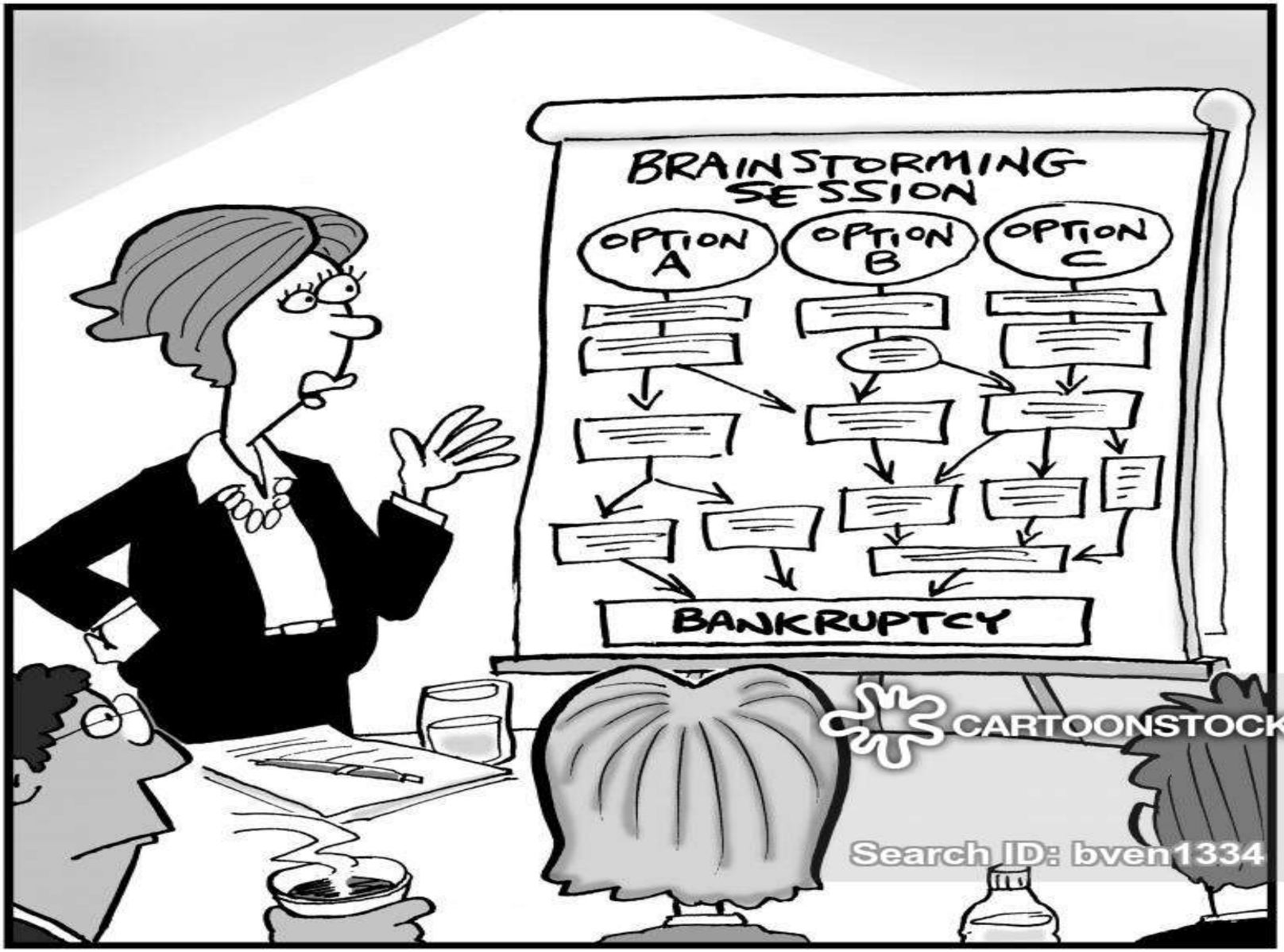


The sinus rhythm seen at the beginning and at the end of the tracing- Black arrows

ECG of VT

- Very broad complexes (>160ms).
- Extreme axis deviation
- AV dissociation
- Capture beats
- Fusion beats
- Brugada's sign
- Josephson's sign
- RSR' complexes with a taller "left rabbit ear". This is the most specific finding in favour of VT.





"Why is it that every time we try thinking out of the box, we end up in an even WORSE box?"

Thanks for your presence & patience.

Have a great day in BSM Congress…