

Hyperkalemia Masking ACS - STEMI: ED Enigma

Rahul Jain¹, Jerry Jacob²

¹Consultant, Emergency Medicine, Yashoda Super Speciality hospitals, Kaushambi, UP, India

²Assistant professor, Emergency Medicine, Ramaiah Medical college, Bengaluru, India

Abstract: *Acute coronary syndrome ST segment elevation myocardial infarction with inferior wall myocardial infarction with right coronary artery block (ACS - STEMI - IWMI) usually presents with bradyarrhythmias¹ due to common blood supply to sinus node^{2,3} and hyperkalemia higher than >7.5 meq/L known to cause and present as ventricular fibrillation, sinoatrial and atrioventricular blocks, asystole, complete heart blocks secondary to disordered membrane polarization.^{4,5} Here we describe a case who presented to emergency room with junctional bradycardia and had severe hyperkalemia and metabolic acidosis, despite antihyperkalemic measures and metabolic acidosis treatment patient didn't improve and was found to have ACS - STEMI*

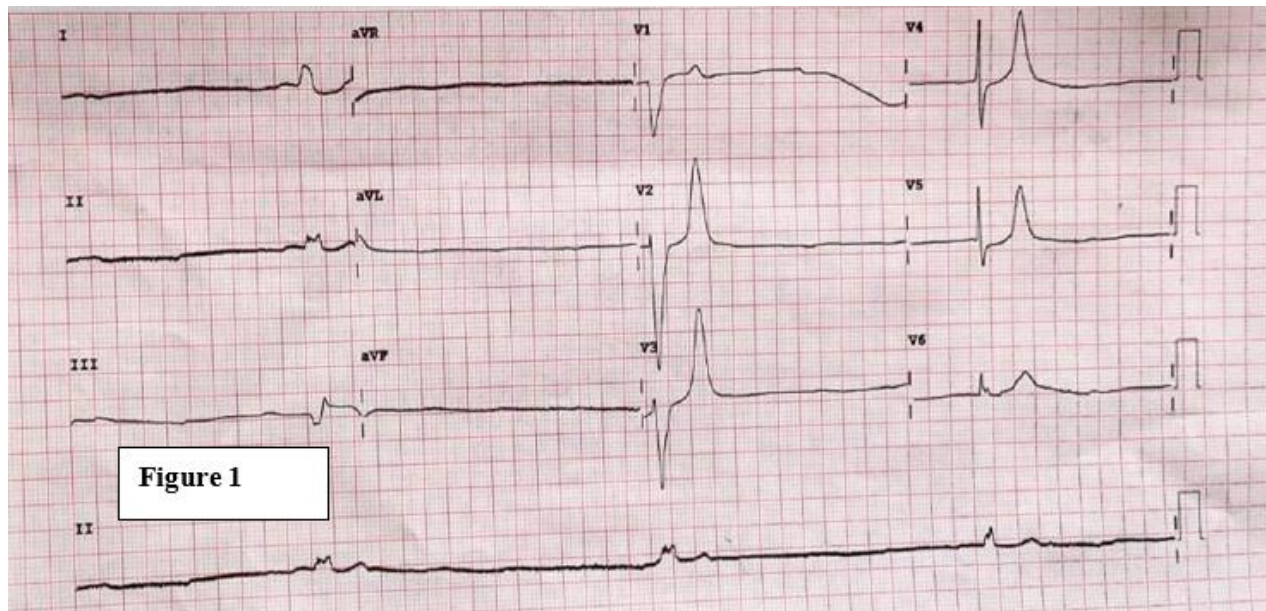
Keywords: STEMI, hyperkalemia, bradyarrhythmia

1. Introduction

Case report

66 year old male known case of Type 2 diabetes mellitus and hypertension since 5 years came to emergency room at 6 - 30am with c/o altered mental status since 40 - 45 mins (which occurred during sleep in the form of agitation and restlessness) and 1 episode of vomiting, attenders also gave history of dependent bilateral lower limb edema since 15 days, on primary survey - airway was not patent, noisy

breathing was present, patient ventilation was assisted by bag mask with 100% oxygen and planned for securing airway through endotracheal intubation. breathing was spontaneous and efforts were inadequate and RR - 8cpm and spo2 was not recordable, Arterial blood gas blood sample was drawn and sent, patient Blood pressure was recorded to be 60/40mmhg, peripheries were cold, heart rate was 20 bpm, ECG was taken showed junctional rhythm and tall T waves. (figure 1)



Patient was given injection atropine 1mg iv stat according to advanced cardiovascular life support (ACLS) protocol 2020 and was started on dopamine infusion of 10mcg/kg/min and inj noradrenaline of 10mcg/min via 16G iv cannula in left external jugular vein.

Patient responded to the above treatment and heart rate became 123bpm, BP - 90/60mmhg. (Fig.2)

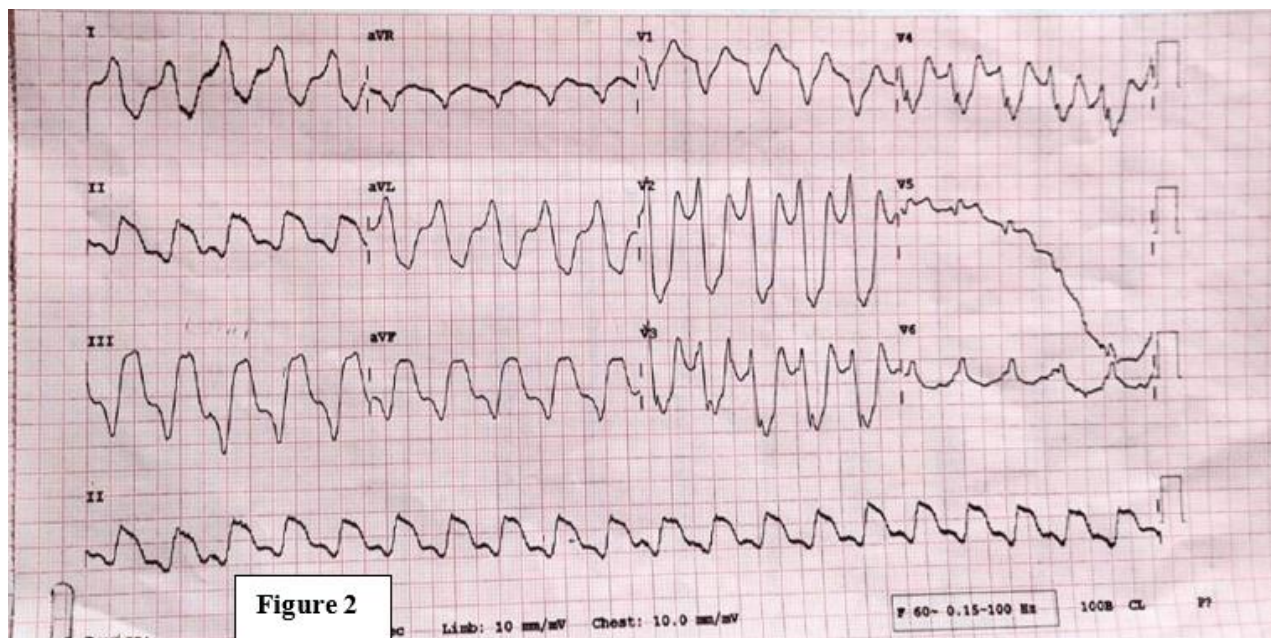


Figure 2

Next minute patient suddenly became unresponsive and had cardiac arrest, Cardiopulmonary resuscitation (CPR) was started as per ACLS protocol by American heart association (AHA), initial rhythm was asystole, CPR was continued for 4 cycles and adrenaline was administered twice (2mg), rhythm was asystole throughout code, airway was secured

during ACLS using CETT no 8 and fixed at 24 cms. Patient achieved return of spontaneous circulation (ROSC) and ABG report showed pH - 7.017, pCO₂ - 47.4, po₂ - 112, Hb - 9.4, Na - 138, K - 6.9, Lactate - 13.5, HCO₃ - 11.6, post ROSC - rhythm was accelerated junctional rhythm (Figure 3) with HR - 72 bpm and BP - 100/60mmhg,

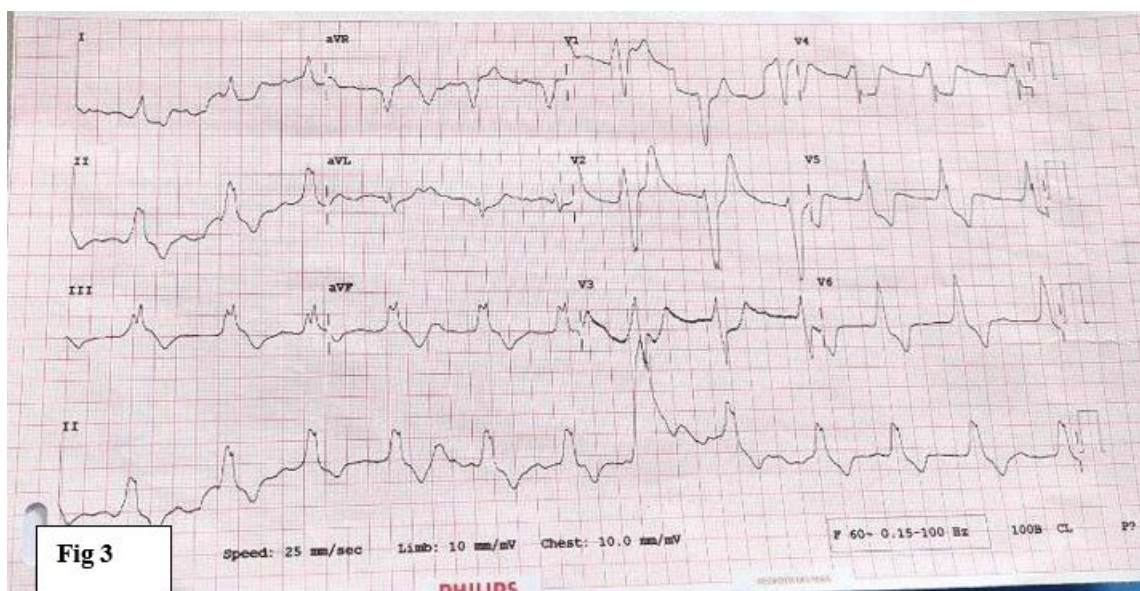


Fig 3

Patient was continued on inotropic support and was administered anti hyperkalemic measures in form of inj calcium gluconate 10%, inj sodium bicarbonate and inj 25% dextrose with insulin (human actrapid), inline nebulization with salbutamol and calcium polystyrene polysulphonate 30gms powder was given via Ryle's tube.

Patient was also given inj magnesium sulphate 2gm iv.

Before starting antihyperkalemic measures Blood investigations were drawn and sent for Complete blood count, renal function test, electrolytes, cardiac markers.

2D echo was done showed concentric LVH, fair LV systolic function, LVEF - 50%, no RWMA, mild AR, TR, moderate MR, PASP - 60mmhg, IVC - Dilated, no PE/ Clots/ Vegetations.

At around 7 - 07 am patient ECG showed ventricular trigeminy f/b complete heart block f/b ventricular bigeminy over 1 min and went back to junctional rhythm, Patient was started on transcutaneous pacing (demand mode) i/v/o varying heart rate and haemodynamic instability.

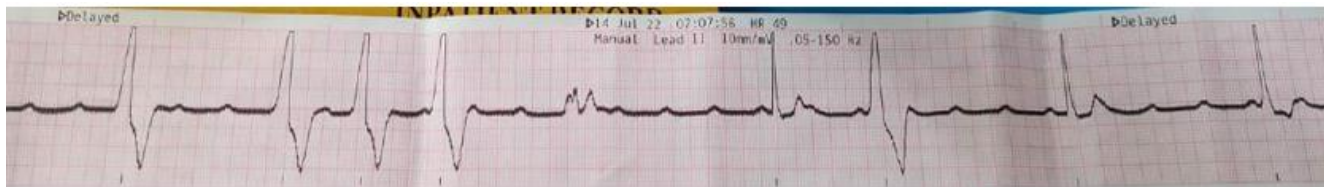


Figure 4: Ventricular trigeminy f/b complete heart block



Figure 5: Complete heart block

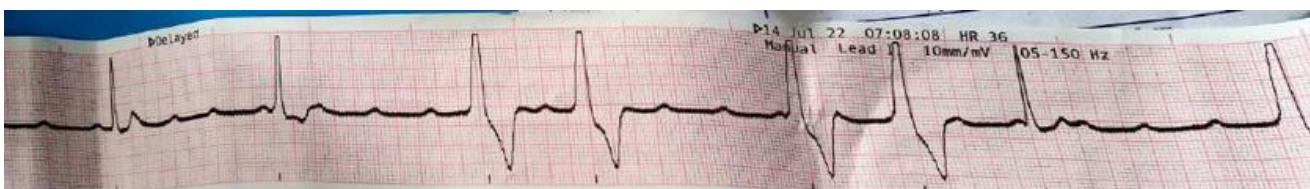


Figure 6: Complete heart block f/b ventricular bigeminy

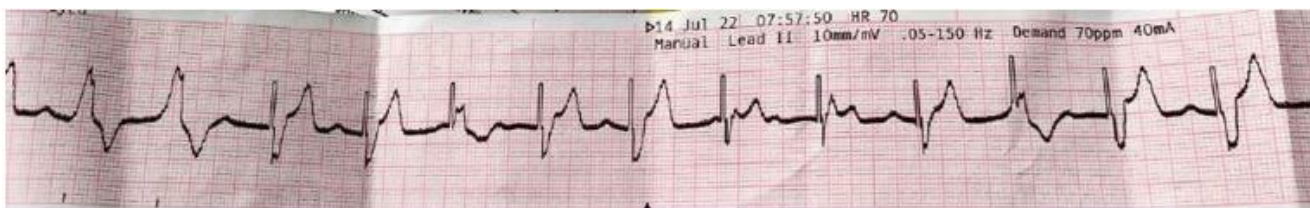


Figure 7: Accelerated junctional rhythm f/b paced rhythm

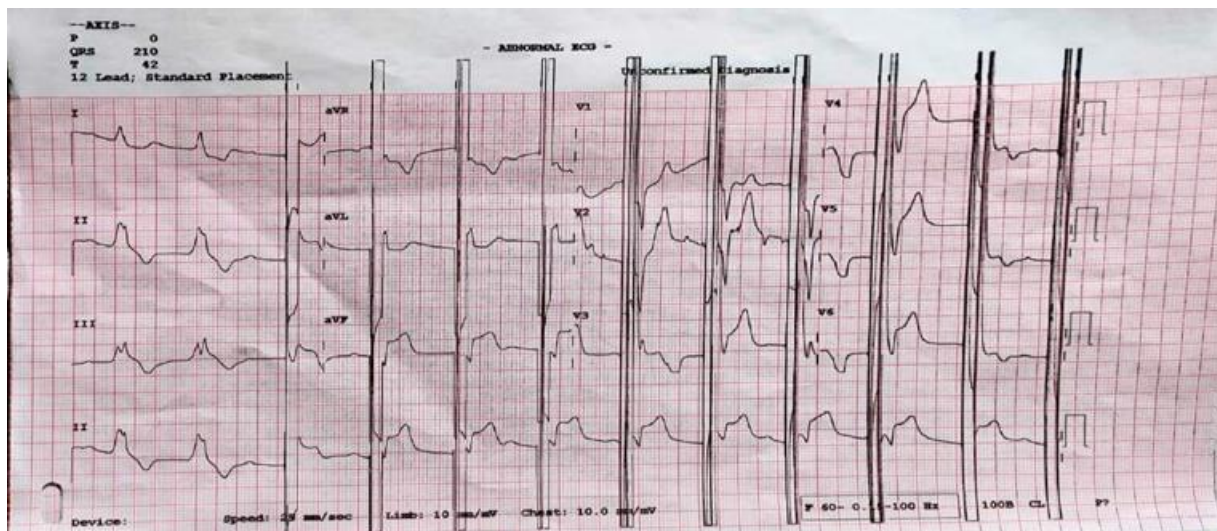


Figure 8: ECG with transcutaneous pacing

Blood reports collected showed -

Table 1

Time & Date	14/07/22- 6 - 50am	14/07/22 - 7 - 29am	14/07/22 - 06 - 00pm	15/07/22 - 06 - 00am	16/07/22 - 06 - 00am	17/07/22 - 06 - 00am
ABG -						
Ph	7.017	7.121	7.34	7.35	7.41	7.362
HCO3	11.6	9.4	21.7	17.0	26	23.2
Pco2	47.4	30.1	41.3	31.2	41.3	41.9
Po2	112	240	136	279	164	144
Lactate	13.5	8.1	2.2	2.1	2	1.1
Potassium	6.9	5.1	4.7	4.3	4.1	4.3

Volume 13 Issue 4, April 2024

Fully Refereed | Open Access | Double Blind Peer Reviewed Journal

www.ijsr.net

Table 2

Date and time	14/07/22 - 6 - 50am	14/07/22-8 -24am	14 - 07 - 22-7-00pm	15/07/22 - 06 - 00am	16/07/22 - 06 - 00am	17/07/22	18/07/22	19/07/22
S creatinine	4.29			2.75	2.30	2.10	3.1	3.5
Sodium	136	135	140	139	136	136	137	137
Potassium	>7	6.07	4.91	4.49	3.73	2.95	3.06	4.1
Hb	8.6		7.9	8.9	7.3	8.1	7.5	8.9
Platelet count -	188k		179k	167k	145k	147k	148k	152k
TLC -	17300		16700	15900	11000	8900	8100	9800
Troponin I	790 pg/ml							

Repeat ABG showed normalized potassium but i/v/o persistent metabolic acidosis, patient was planned for temporary haemodialysis and HD catheter was placed in

right femoral vein and dialysis was performed. Post haemodialysis ECG was done and showed ACS - STEMI - inferior wall with right coronary involvement.

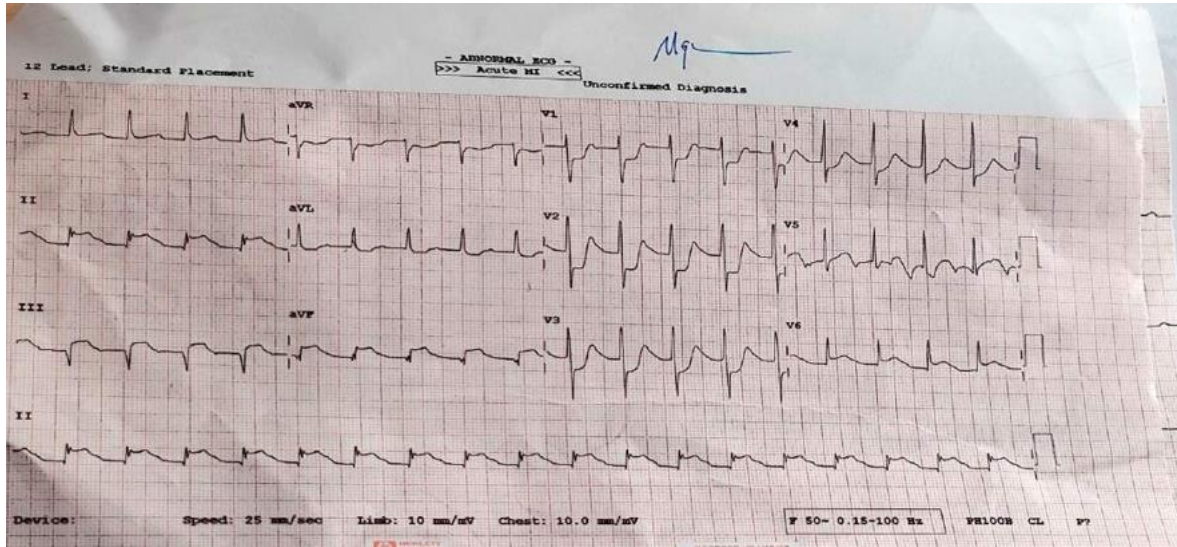


Figure 9: ACS - STEMI - IWMI - RCA

Patient was taken up for Percutaneous coronary intervention which showed complete Right Coronary Artery occlusion for which Percutaneous transluminal coronary angioplasty done and RCA recanalized and repeat ECG is as follows

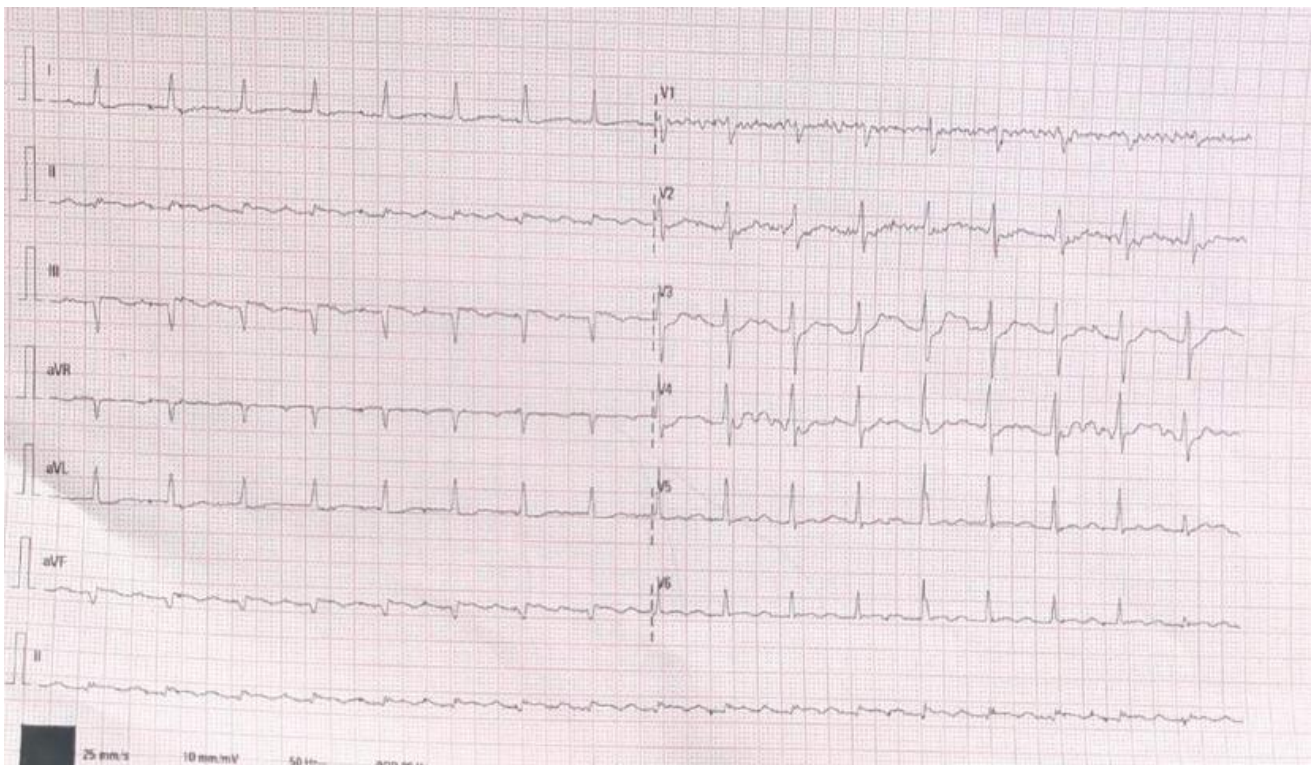


Figure 10: Post PTCA ECG

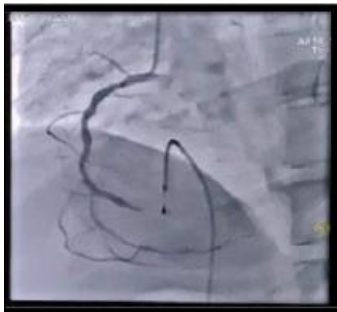


Figure 11: Complete right coronary artery occlusion in coronary angiogram



Figure 12: Radiopaque angioplasty catheter in situ in coronary circulation



Figure 13: Recanalisation of right coronary artery Post PTCA

Patient continued to be on ventilatory support for 2 more days and received 2 more haemodialysis sessions and was successfully extubated and was discharged on 8th day.

1. Discussion

Hyperkalemia, hypoxia, hypotension, acidosis and coronary thrombosis are all causes of cardiac arrest, this patient presented in ER with severe hyperkalemia and later found to have coronary thrombosis, on presentation had hypoxia, hypotension and acidosis.

Hyperkalemia is a potential life threatening dyselectrolytemia. Symptoms are non specific and includes muscular or cardiac dysfunction.⁶

Cause of hyperkalemia can be due to decreased renal potassium excretion, increased potassium load and variation in aldosterone levels.

Hyperkalemia presents with cardiac dysrhythmia's such as ventricular fibrillation, sinoatrial and atrioventricular blocks, complete heart blocks and asystole, patient can also present with neuromuscular dysfunctional weakness, paresthesias,

areflexia, ascending paralysis and GI effects (nausea, vomiting and diarrhea)

ECG changes⁴ include -

Potassium level (meq/L)	ECG changes
6.5 - 7.5	Prolonged PR interval
7.5 - 8.0	Flattening of P wave, QRS widening
10 - 12	Sinusoidal pattern

Management of severe hyperkalemia⁷ is based on stabilization of cardiac myocyte membrane, measures to reduce intravascular potassium levels and increasing potassium excretion

All drugs act via activation of sodium - potassium ATPase thus increasing uptake of potassium intracellularly.

Measures to increase potassium excretion includes administration of sodium polystyrene sulfonate and haemodialysis.

Inferior wall STEMI can present with Sinus bradycardia, Sinus tachycardia, Atrial fibrillation, Ventricular premature complexes (vpcs), 1st degree heart block, 2nd degree heart block type 1, complete heart block, VPC, junctional rhythm¹. Management of ACS - STEMI includes stabilizing ABC, recognizing ACS and revascularising the anticipated block in the coronary artery as per coronary angiogram.

IWMI with RV infarction, these patients depend on Right ventricular filling pressures to maintain cardiac output and blood pressures, nitroglycerin, morphine and diuretics are contraindicated in this type of MI.

2. Conclusion

To conclude we report a rare case of hyperkalemia masking ACS - STEMI - IWMI with RV infarction and where 2D Echocardiography findings were normal and initial Troponin I elevation was ascertained to chronic kidney disease and post CPR ROSC status, potassium correction and complete correction of acidosis revealed hidden STEMI in repeat ECG which was confirmed by CAG, hereby showing 2D ECHO can be unreliable rarely in STEMI cases and importance of Serial arterial blood gas analysis in saving lives in ED.

Funding - self

Conflict of interest - nil

References

- [1] Ravikumar T. N, Anikethana G. V. Study of Arrhythmias in Acute Inferior Wall Myocardial Infarction. Journal of Evidence Based Medicine and Healthcare.2014; 1 (7): 533 - 8.
- [2] Mhatre MA, Sirur FM, Rajpal DR, Shah MR. A clinical study of arrhythmias associated with acute myocardial infarction and thrombolysis. Int J Res Med Sci.2017; 5: 335 - 43.
- [3] Majumder AA, Malik A, Zafar A. Conduction disturbances in acute myocardial infarction: incidence, site - wise relationship and the influence on in -

- hospital prognosis. Bangladesh Med Res Counc Bull.1996; 22 (2): 74 - 80.
- [4] Judith E Tintinalli, O John, Donald M, Garth D, J Stephan, David M, editors. Tintinalli's emergency medicine a comprehensive study guide, 9th ed. New york: McGraw Hill; 2020.
- [6] Brian T. Montague, Jason R. Ouellette, and Gregory K. Buller. Retrospective Review of the Frequency of ECG Changes in Hyperkalemia, Clinical Journal of the American Society of Nephrology.2008; 3: 324 - 330
- [7] Anja Lehnhardt & Markus J. Kemper. Pathogenesis, diagnosis and management of hyperkalemia. Pediatric Nephrology springer.2011; 26: 377–384
- [8] Dépret, Peacock, Liu, editors. Management of hyperkalemia in the acutely ill patient. Annals of Intensive Care.2019; 9 (1), 32. doi: 10.1186/s13613 - 019 - 0509 - 8.