



Challenges in Managing *Acute Myocardial Infarction Cardiogenic Shock* in Level II Shock Centers

“Creating Order out of Chaos”

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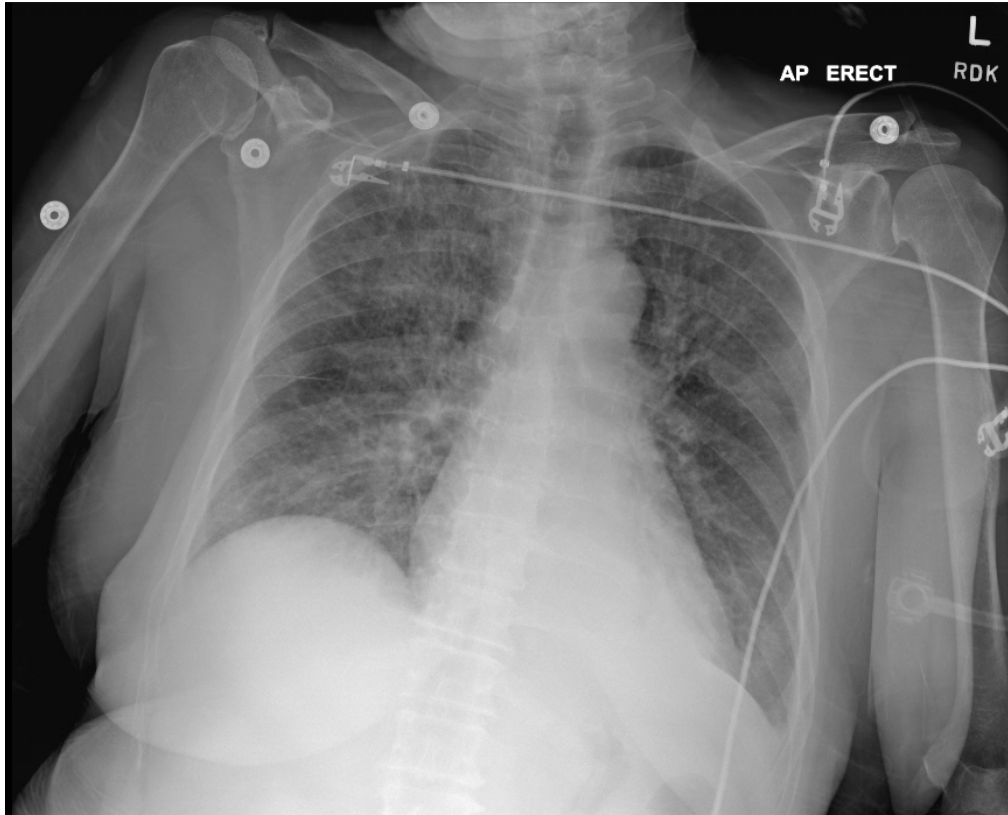
Case Presentation

- 70 F (Karen) with no significant PMH who developed nausea, vomiting, abdominal pain, and diarrhea beginning on 3/8/23.
- She presented to the ED on 3/11/23 with persistent symptoms.
- Exam: 88/60mmHg, 102/min & afebrile, weight 50kg, no respiratory distress, breath sounds diminished, heart sounds were normal

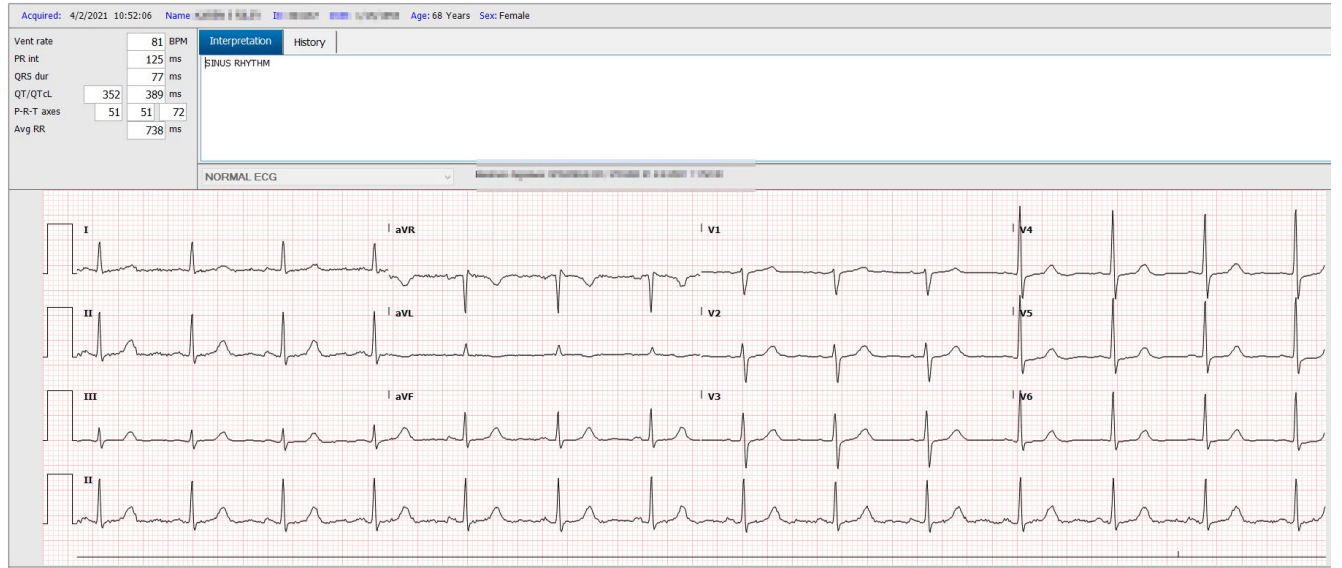
Laboratory Data

- Hb 13.9, wbc 15.2, plts. 227
- Na 134, K 3.3, Cl 100, HCO₃ 29
- BUN 18, creat. 0.84, BS 102
- AST 309, ALT 79, Lactate 1.7
- Troponin I 40,009 ng/L

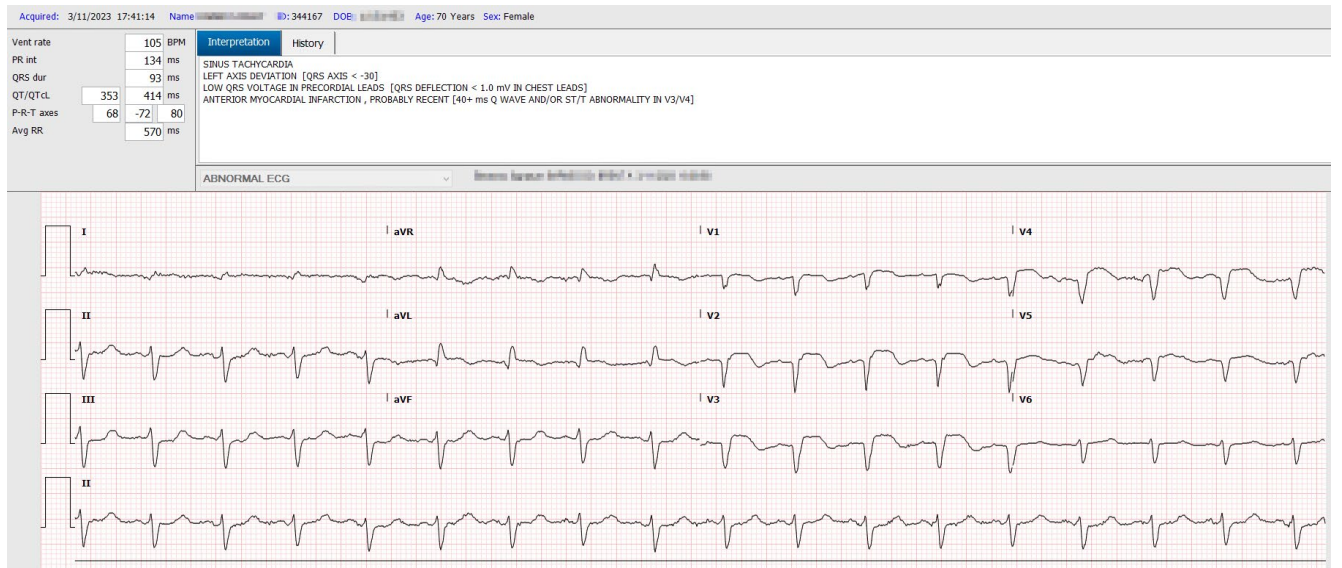
CXR & ECG



Baseline 2021



In ED 3/11/23



1. Cardiac Catheterization

Right Heart Cath



Measurements

Parameter	Baseline
RA	9
PA	53/23 (36)
PCW	19
CO / CI	2.4 / 1.6
PVR	7.1
CPO	0.38
PAPI	3.3
Ao	98/56 (71)

Hemodynamic Calculations

3.1-7.9 W ♂
2.5-5.6 W ♀

(1) Cardiac Power Output (CPO) $\frac{MAP \times CO}{451}$
Normal > 0.6 Watts

(2) Pulmonary Artery Pulsatility Index (PAPI) $\frac{sPAP - dPAP}{RA}$
Normal > 1.0



Coronary Angiogram






2. Is this Cardiogenic shock? What's the Stage?

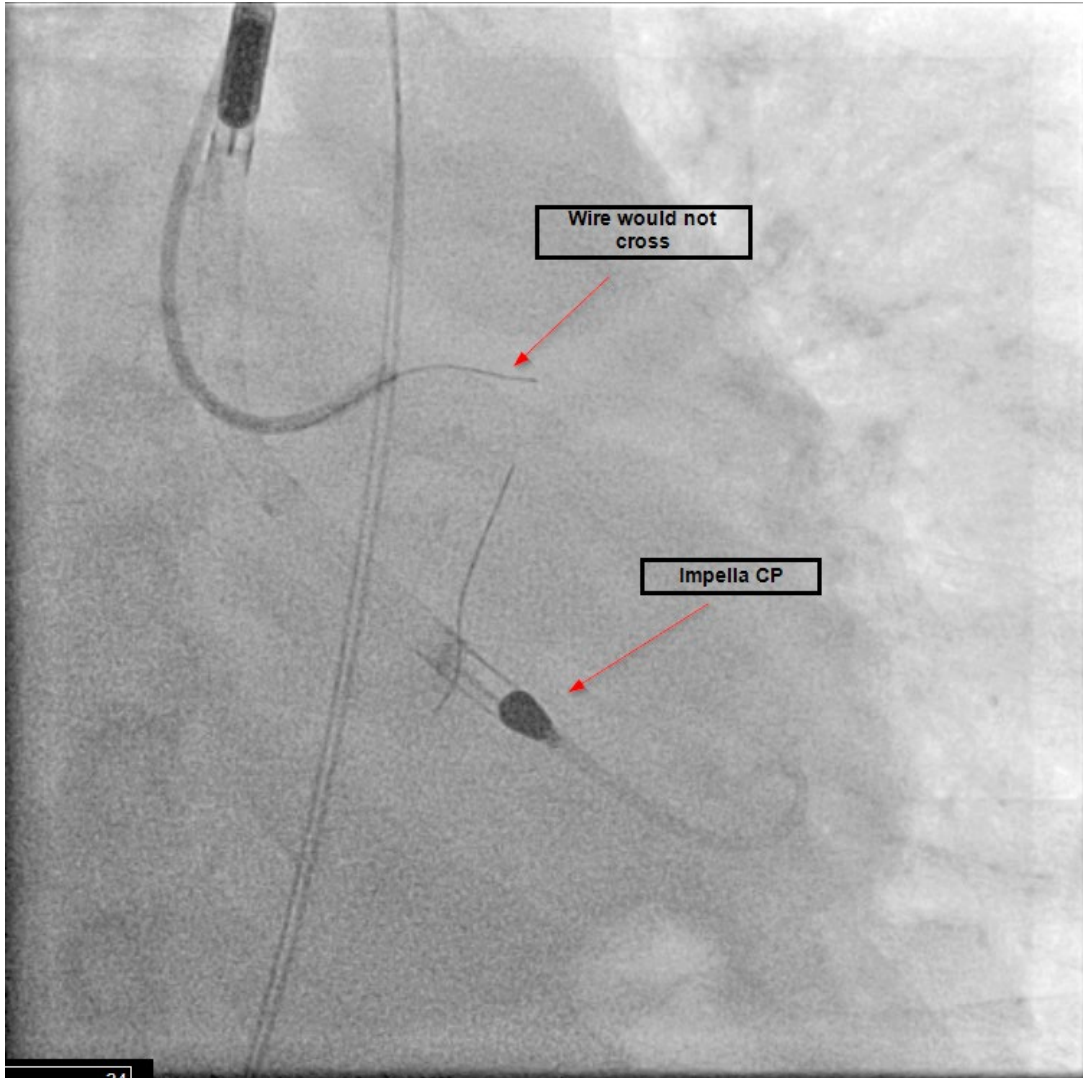
B Beginning CS	A patient who has clinical evidence of hemodynamic instability (including relative hypotension or tachycardia) without hypoperfusion.	Elevated JVP Warm and well-perfused <ul style="list-style-type: none"> • Strong distal pulses • Normal mentation 	Rales in lung fields	Normal lactate	Minimal acute renal function impairment Elevated BNP	Hypotension <ul style="list-style-type: none"> • SBP <90 mmHg • MAP <60 mmHg • >30 mmHg drop from baseline Tachycardia <ul style="list-style-type: none"> • Heart rate ≥100 bpm
C Classic CS	A patient who manifests with hypoperfusion and who requires one intervention (pharmacological or mechanical) beyond volume resuscitation.	Volume overload	Looks unwell Acute alteration in mental status Feeling of impending doom Cold and clammy Extensive rales Ashen, mottled, dusky, or cool extremities Delayed capillary refill Urine Output <30 mL/h	Lactate ≥2 mmol/L	Creatinine increase to 1.5 x baseline (or 0.3 mg/dL) or >50% drop in GFR Increased LFTs Elevated BNP	If invasive hemodynamics assessed (strongly recommended) <ul style="list-style-type: none"> • Cardiac index <2.2 L/min/m² • PCWP >15 mmHg

These patients typically present with relative hypotension (but hypotension is not required).

3. Consider Mechanical Circulatory Support

Parameter	Baseline	Post-MCS (Impella CP)
RA	9	10
PA	53/23 (36)	56/27 (39)
PCW	19 	16
CO / CI	2.4 / 1.6 	2.7 / 1.9
PVR	7.1	8.5
CPO	0.38 	0.45
PAPI	3.3	2.9
Ao	98/56 (71)	(75)

Clinical Course



- PCI attempted, not successful
- Patient was transferred to UPMC, where PCI of the LAD was performed
- Further hemodynamic instability ensued
- (3/12/23) Escalation of MCS to **Impella 5.5 & VA ECMO**
- (3/15/23) **VA ECMO decannulation**
- (4/7/23) **Impella 5.5 > LVAD, HeartMate III**
- (5/10/23) Discharged to home from Rehab

Post LVAD follow-up 6/8/23

Karen looks
great!



Summary

Assessment

- Is it Cardiogenic Shock?
- What is the Stage and Trajectory
- Right heart catheterization

Management

- MCS
- Revascularization
- Decision to transfer

Follow-up

- Recovery
- Bridge to transplant
- Destination Therapy

DuBois Regional Cardiology Associates LVAD clinic



Manreet Kanwar, MD, FACC
Director, Mechanical
Circulatory and Cardiac
Transplant Program, CVI of
AHN



Gavin Hickey, MD, FACC
Medical Director, VAD and
Transplant Program, UPMC
Heart and Vascular Institute

The Sequel

- A few months later...
- Karen's husband Chuck 72M
CAD, PAD, CKD & COPD
- (8/2/23) Admitted w/ abdominal pain, elevated lactate and metabolic acidosis
- Diagnosed with mesenteric ischemia
- (8/3/23) Ex. lap, (L)colectomy & cecectomy
- (8/5/23) Ex. lap, ileocecectomy
- (8/7/23) Ex. lap, completion subtotal colectomy & end ileostomy
- Complex post-op course, including AKI requiring HD
- Making a slow recovery

Post-op Day 25

*A Big Thanks
from Chuck and
Karen*



My personal takeaways

- **Emergencies are part of any complex, high-level profession.**
- **Dealing with these events effectively requires the proper training, skills, and attitude. (*“Know what you don’t know”*)**
- **Early collaboration can lead to life-changing outcomes.**
- **Not everything will turn out as expected. A mature and sensitive response to a bad event is critical for the patient, their family, and your team.**

Thanks again!

